EDP industry report and market review

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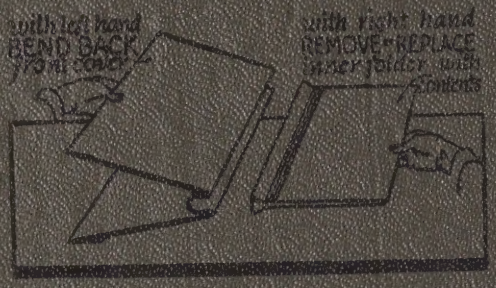

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INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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THE GRAY SHEET
Computer Industry
REPORT

Published continuously since 1964.

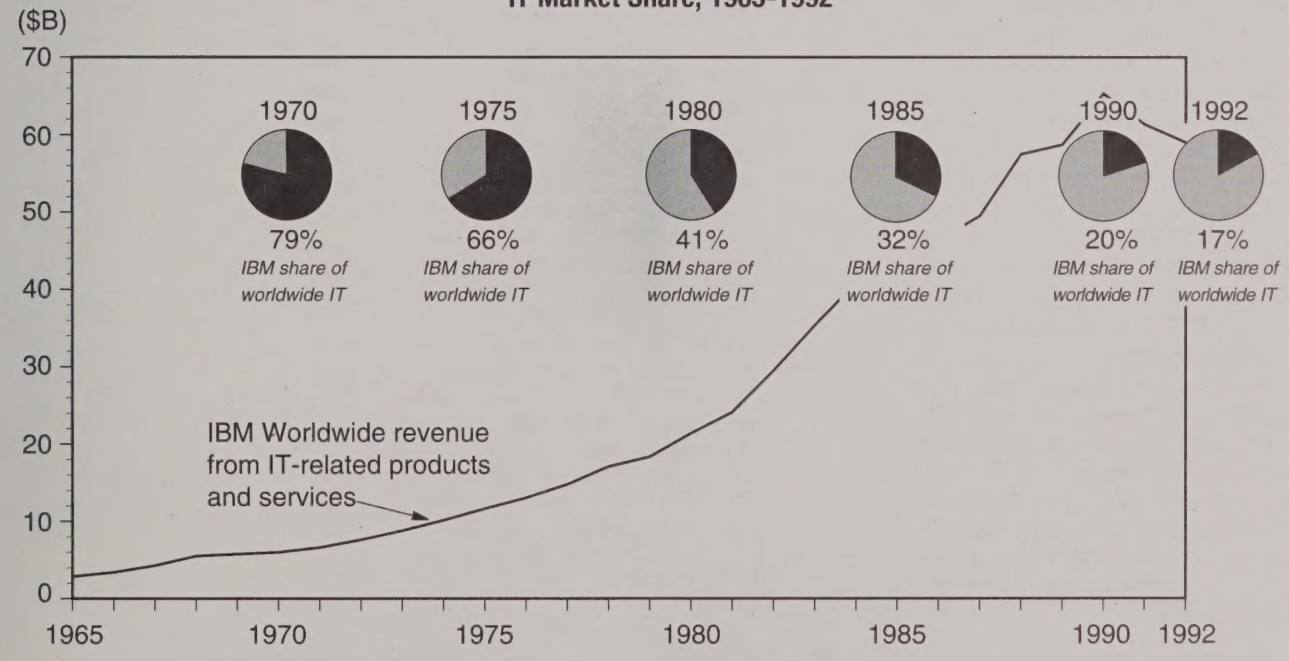
Thirty Years of Change

A Special Report

March 23, 1964 – Volume 1, Number 1

"Unofficial estimates given to us by a marketing spokesman at IBM's Data Processing Division indicate that IBM expects to install 5,000 units of its as yet unannounced new computer series in the next five years."

IBM's Information Technology-Related Revenue and Overall Worldwide IT Market Share, 1965-1992



February 19, 1988 – Volume 23, Number 20

" IBM restructured because Armonk, after years of denial, finally realized that it has a real problem on its hands. Things aren't, nor are they soon going to get, significantly better."

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A Pictorial Perspective on 30 Years of Change

What percentage of the worldwide population uses some kind of PC? How does that compare to ten years ago? When did Unix server sales overtake sales of other midrange systems? Is spending on mainframes really declining? How fast? Where?

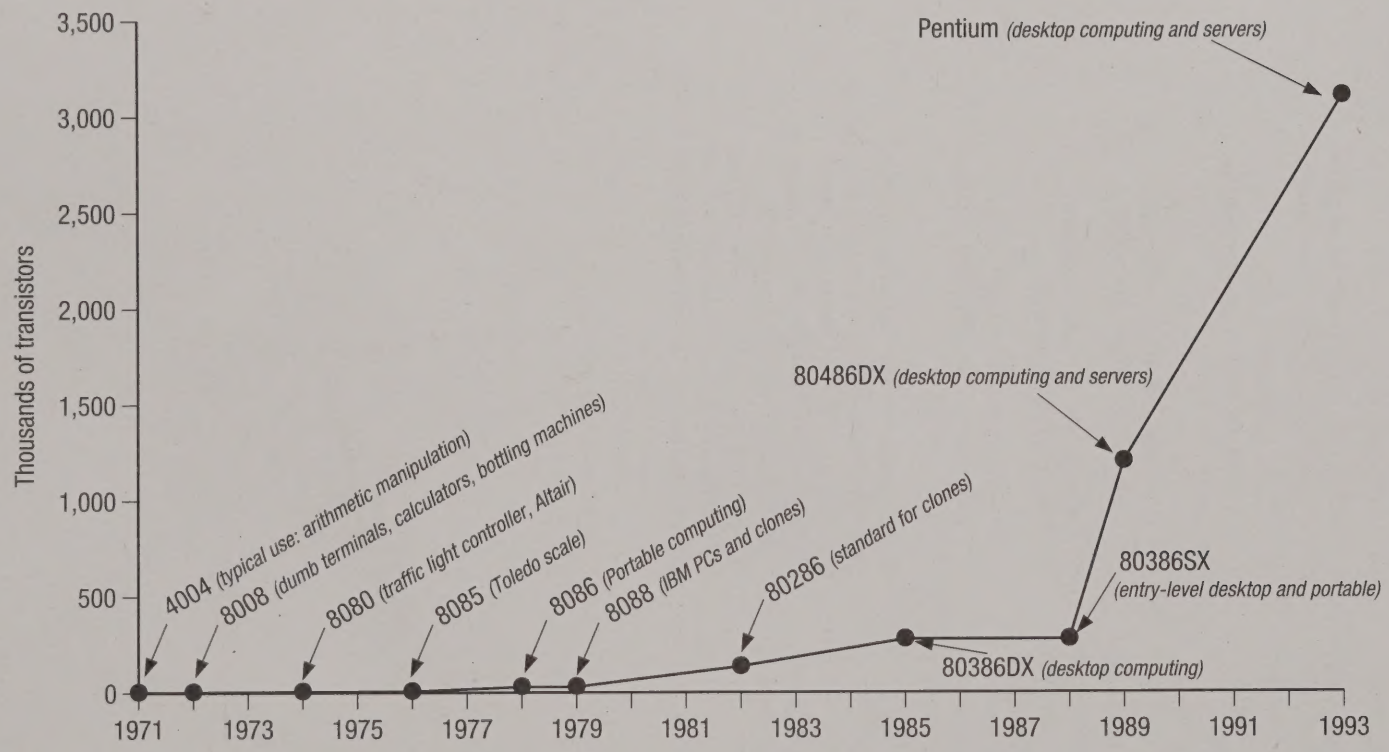
Every week IDC provides its clients with facts and figures that illustrate change in the IT industry. These include questions about how new products have fared, or how trends like downsizing, outsourcing, and networking have overtaken industry tradition. Often we are asked if we have historical evidence of how such longer-term dynamics have effected change.

The information is typically needed for presentations, press releases, marketing backgrounders, and reports. More generally it is needed to answer one of four questions:

- How much further can the industry grow?
- How will growth across specific portions of the industry vary?
- How far has the industry grown over the past 30 years?
- How will a new product or new technology fare, compared to past products?

In preparation for the 30th anniversary of the Gray Sheet, we have assembled a broad range of data from an even broader array of internal and external sources to publish 26 charts and graphs that highlight the state of the IT industry, c. 1993. This issue provides a visual perspective on many of the above questions.

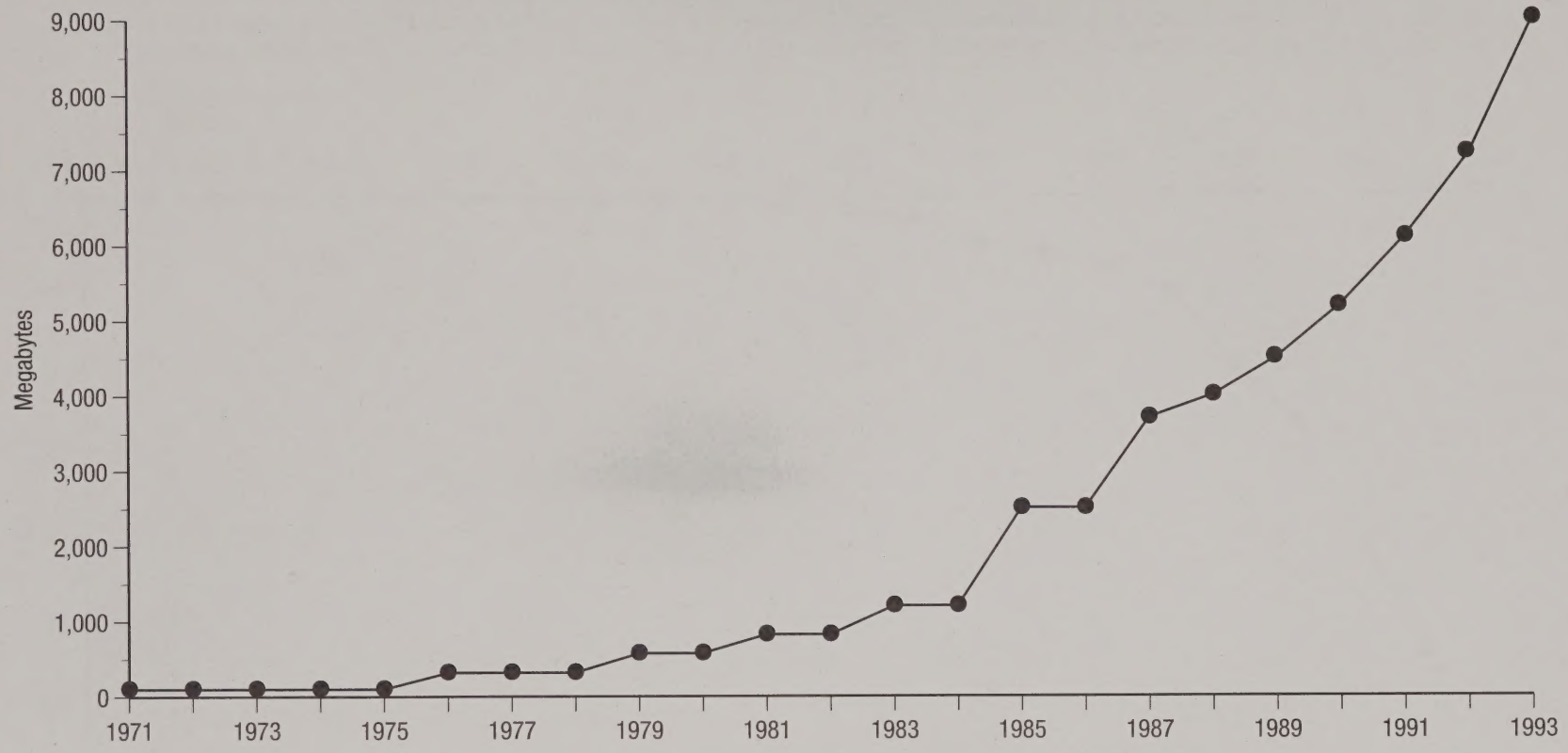
Transistor Chip Density in Intel Microprocessors, 1971–1993



One reason Intel's Pentium is so much faster than the 486 chips is because Intel crammed over three times as many transistors into the same area. That in turn allowed Intel to take functions off the board and put them right onto the chip, reducing I/O waiting. The next generation of Intel chips will likely include sophisticated compression/decompression and digital video algorithms in silicon — a multimedia computer on a chip.

Source: International Data Corporation, 1993

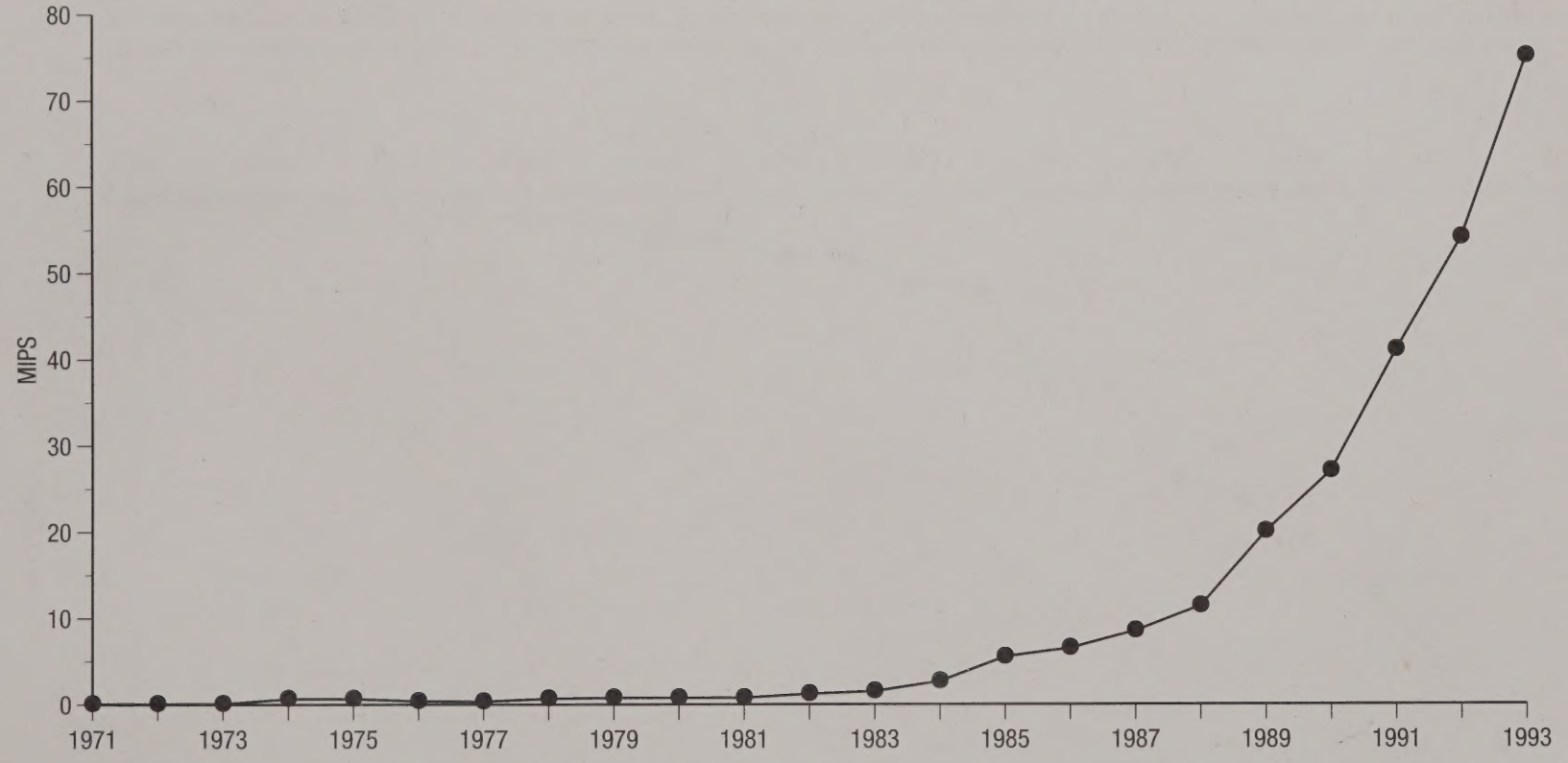
Storage Capacity (MB) Growth, 1971–1993



Lacking a consistent method for incorporating advances in nonmagnetic storage medium (most notably optical devices) the growth in storage performance (measured in both aerial density and overall capacity) is somewhat slower than that of chip technologies. This chart illustrates advances of single-spindle magnetic storage devices at the high end of the market.

Source: International Data Corporation, 1993

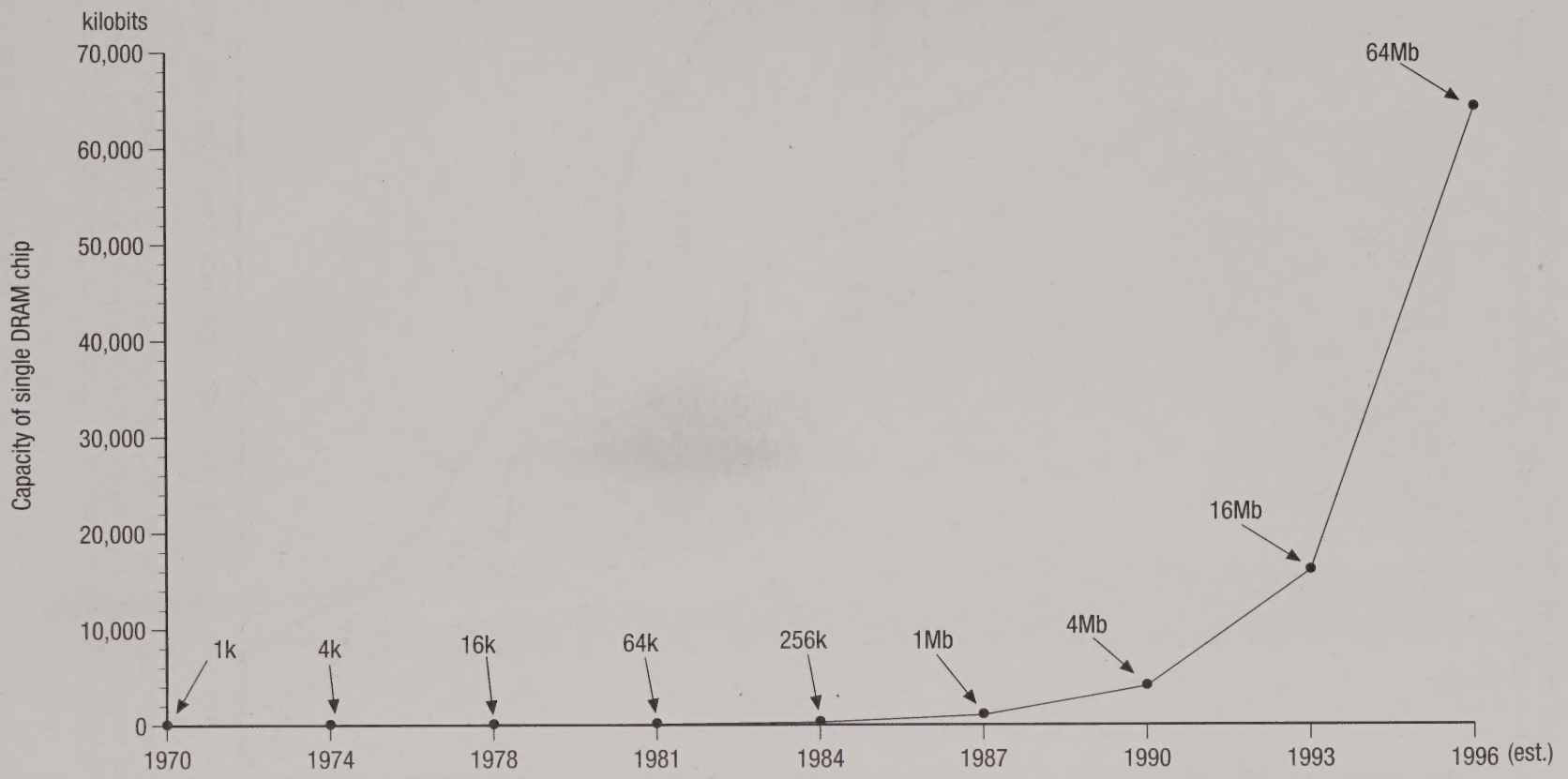
MIPS Growth in Intel Processors, 1971–1993



Performance advances in Intel microprocessors has been a direct function of increasing transistor density. While performance measured in MIPS across families of microprocessors can lead to inaccurate comparisons, it can be used to clearly demonstrate improvements within a single processor architecture.

Source: International Data Corporation, 1993

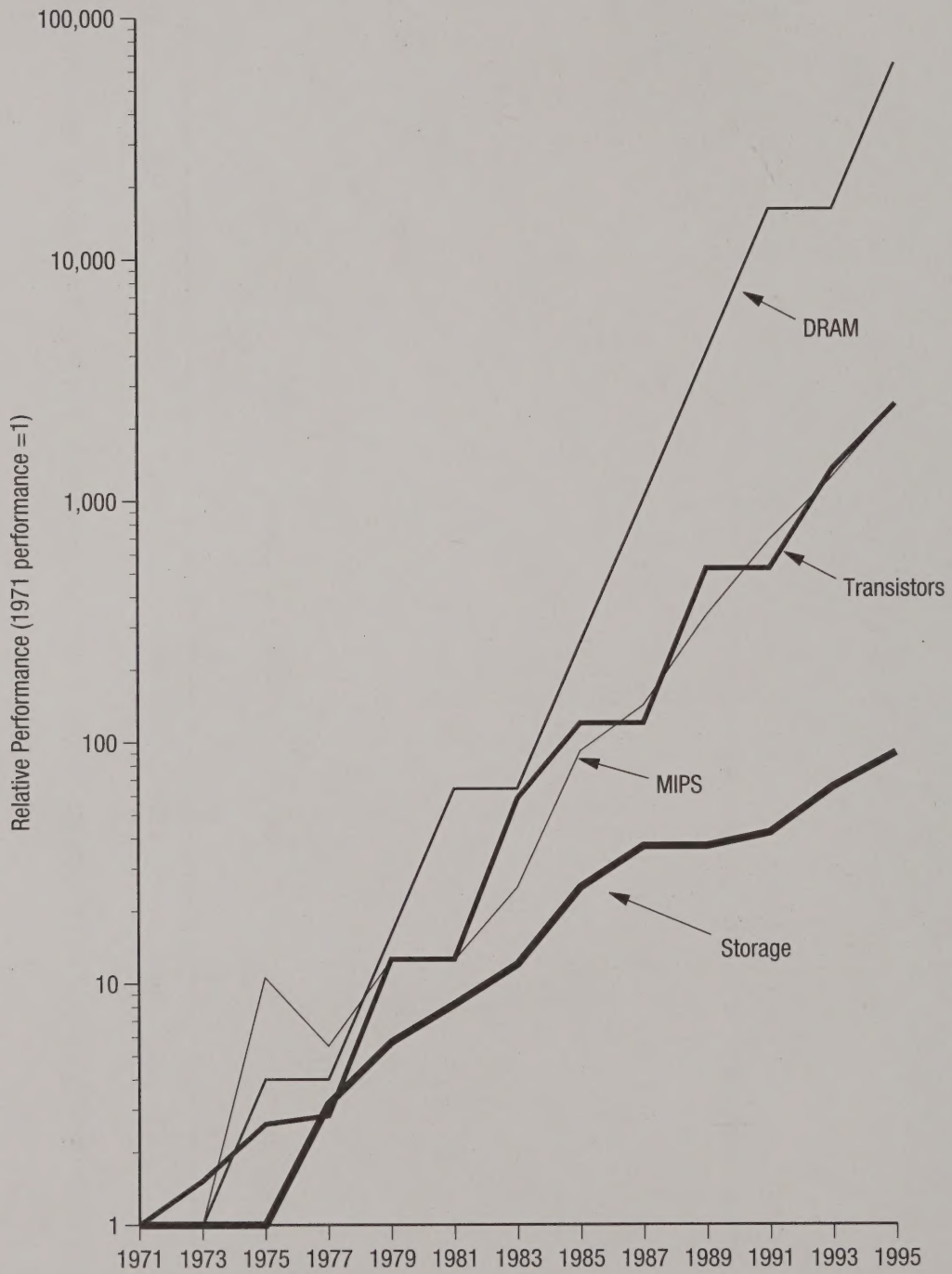
DRAM Chip Capacity 1970–1996 (est.)



DRAM capacity is a direct function of transistor density. DRAM capacity has grown faster than any other computer technology.

Source: International Data Corporation, 1993

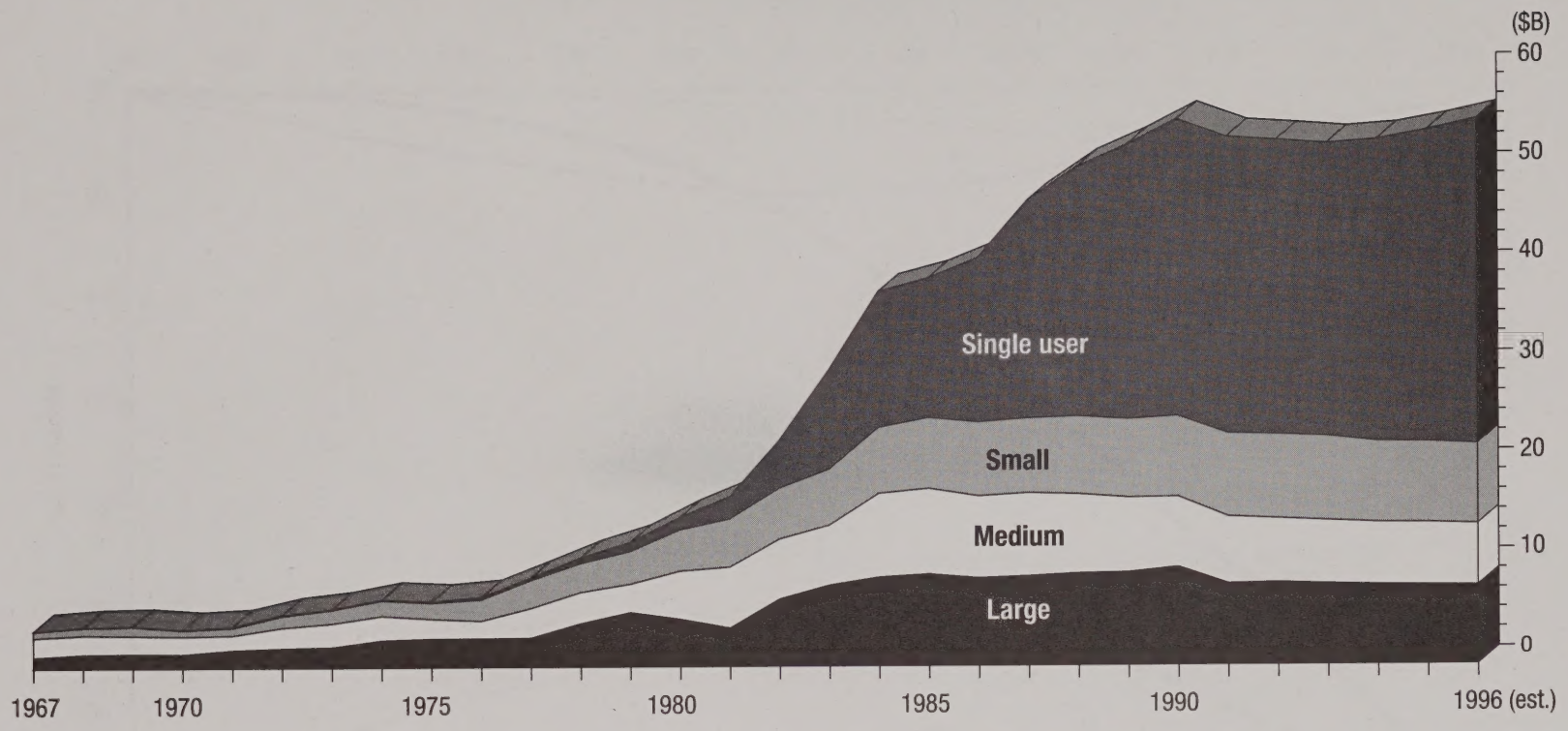
Relative Performance Growth of Four Key Technologies:
Transistor Density, DRAM, MIPS, and Magnetic Storage, 1971–1995



In this chart the performance of the four technologies are indexed to 1971 levels to provide a relative measure of increases. Not surprisingly, transistor density (which drives, in part, MIPS performances and DRAM capacity) has grown faster than magnetic storage.

Source: International Data Corporation, 1994

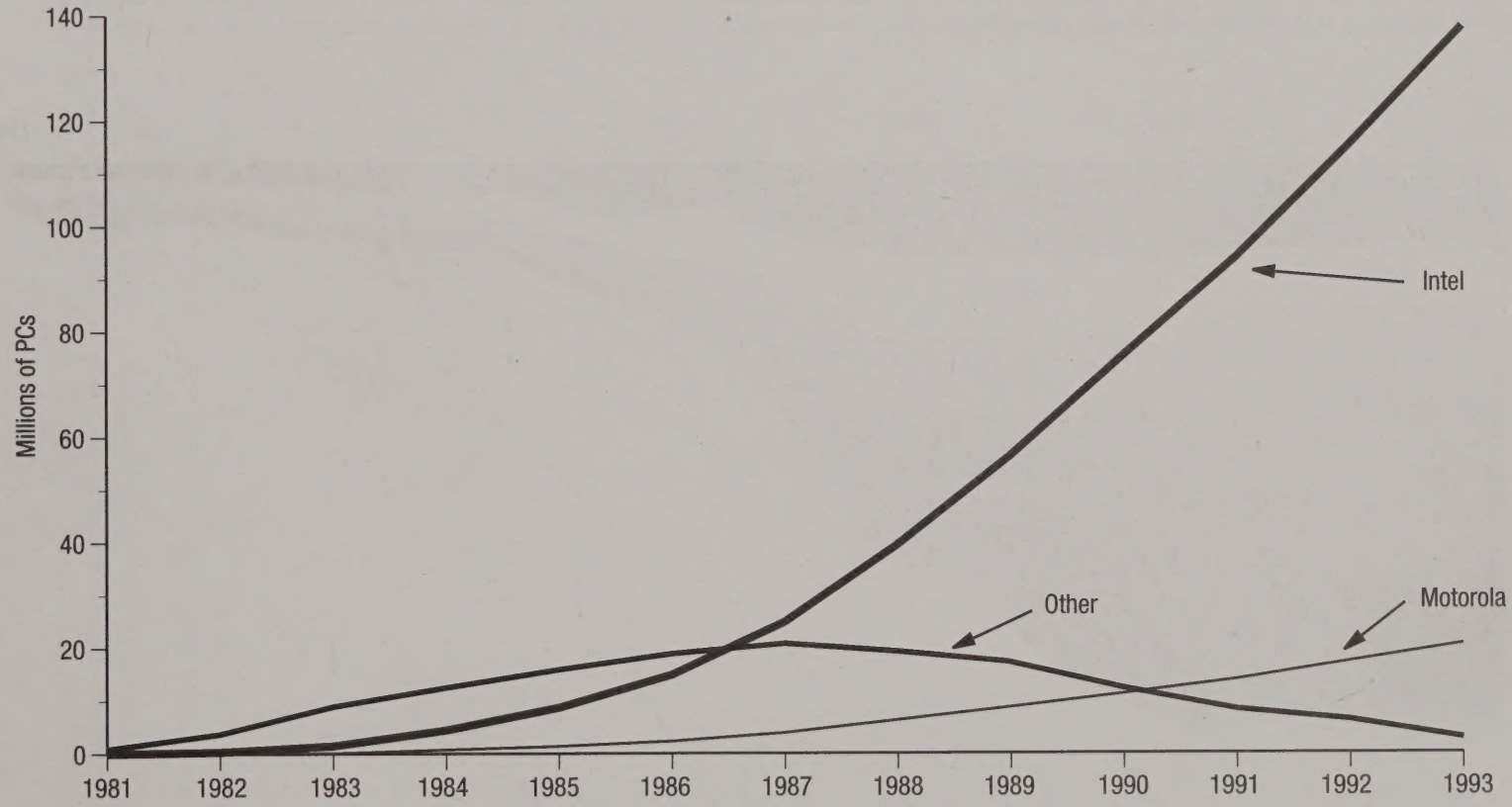
U.S. Market for Multiuser and Single-User Systems, 1967–1996 (est.)



The explosive growth of the PC market from 1981 onwards has come at the expense of other types of systems — usually larger mainframes and minicomputers — although the low end of the multiuser systems market has also seen slowed growth. After four years of moderate growth through 1985, spending on all multiuser systems has completely flattened. It is not expected to rebound over the next five years. The biggest loser: large systems, which have decreased from as much as 40% of the overall systems market in 1979 to well under 20% today.

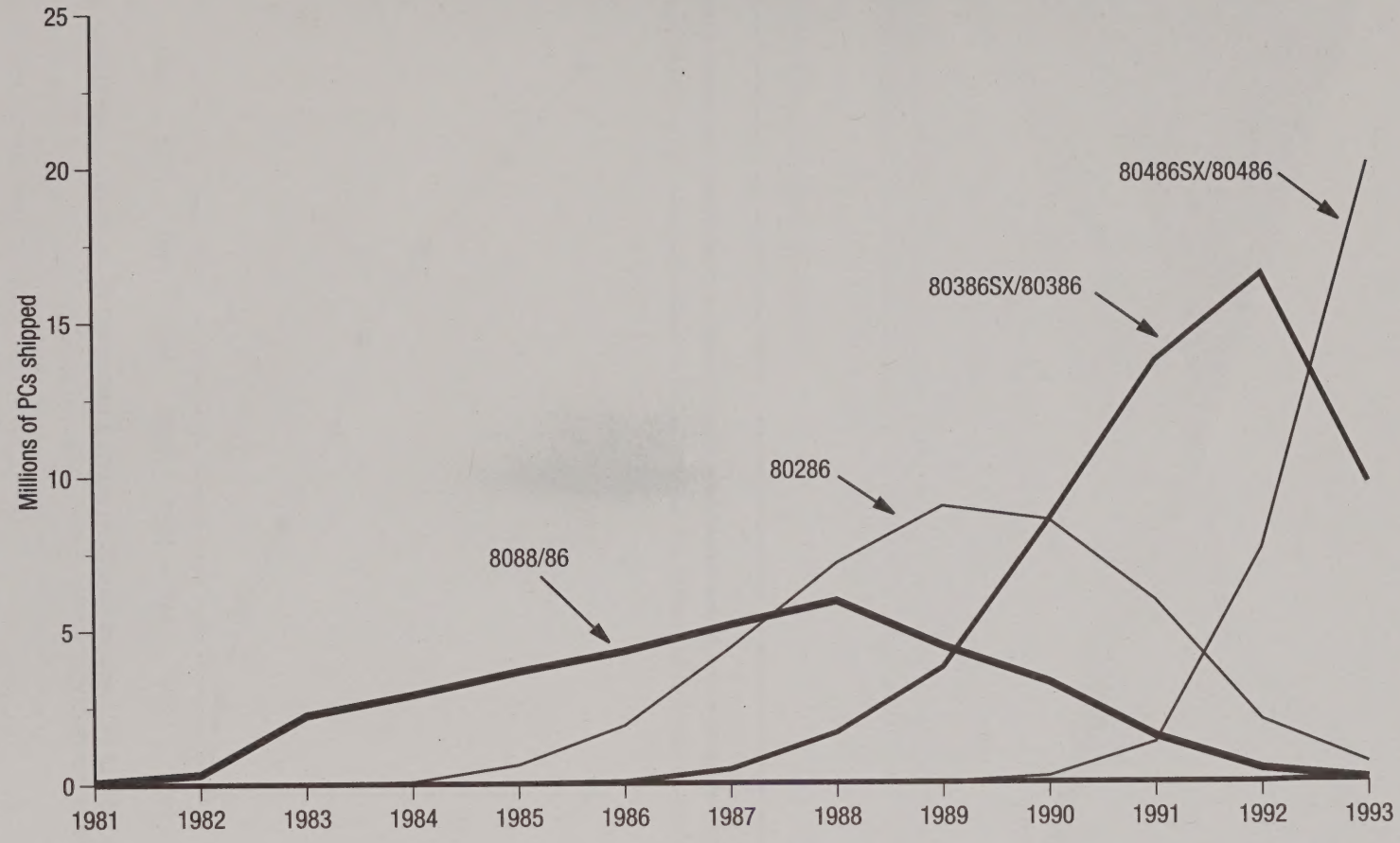
Source: International Data Corporation, 1993

PCs in Use Worldwide by Processor Type, 1981–1993



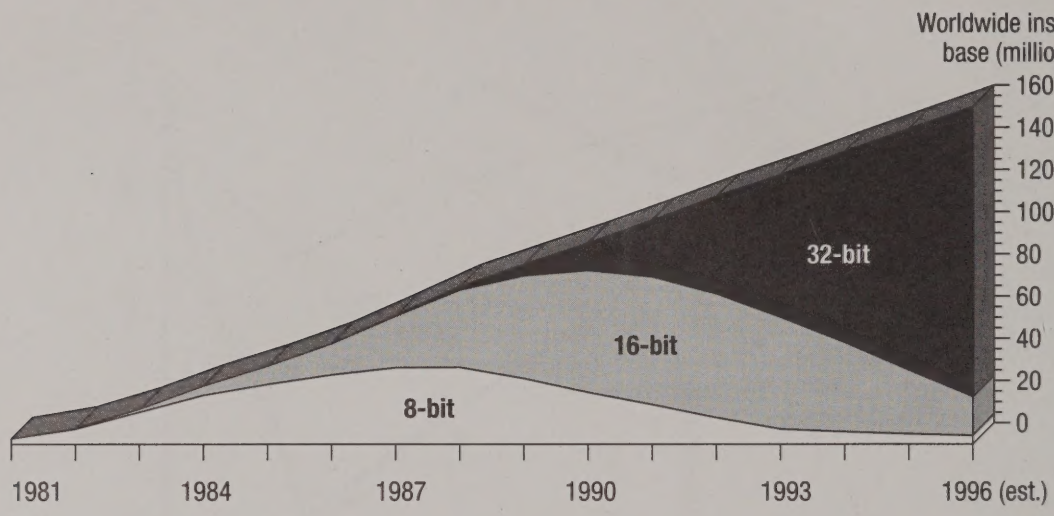
Source: International Data Corporation, 1993

Worldwide PC Unit Shipments by Intel and Compatible Processor Type, 1981–1993



Source: International Data Corporation, 1993

The Invasion of 32-Bit Machines



Sometime this year the worldwide installed base of 32-bit PCs based on the Intel architecture (starting with the 386) will surpass that of 16-bit PCs. Between now and 1996 almost 100 million 32-bit computers will be added to that base.

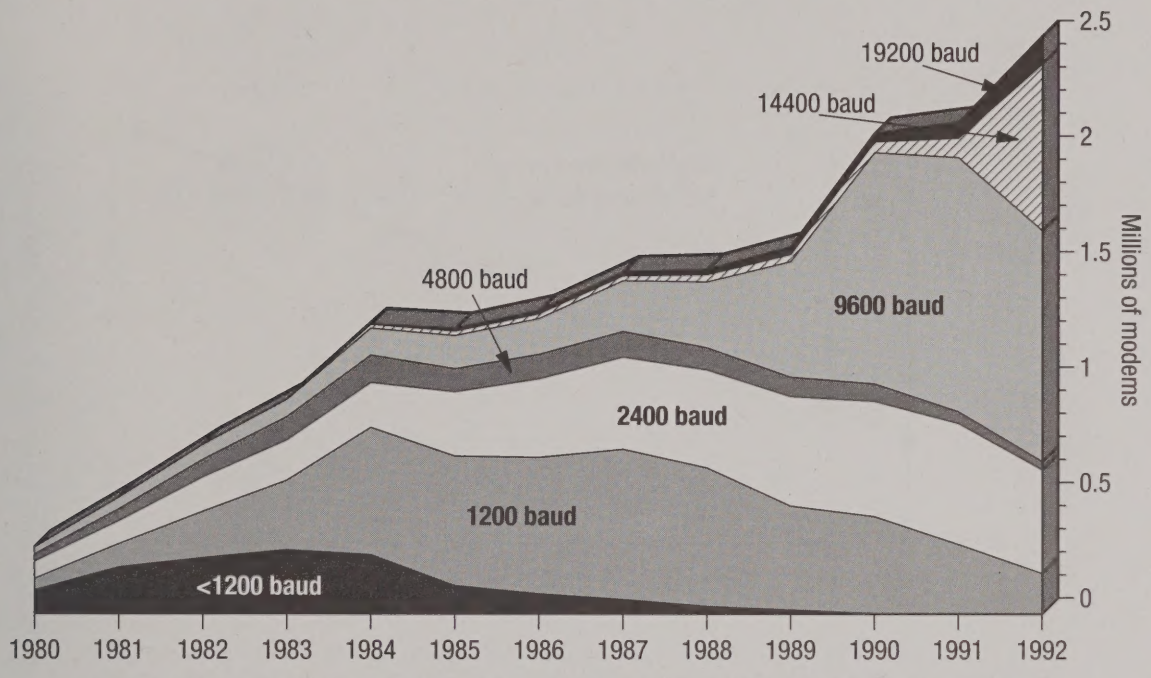
Source: International Data Corporation, 1994

Worldwide PC Network Interface Card Market Shipments, 1985–1993

Penetration of PC network interface cards is expected to continue growing through the end of the decade.

Source: International Data Corporation, 1994

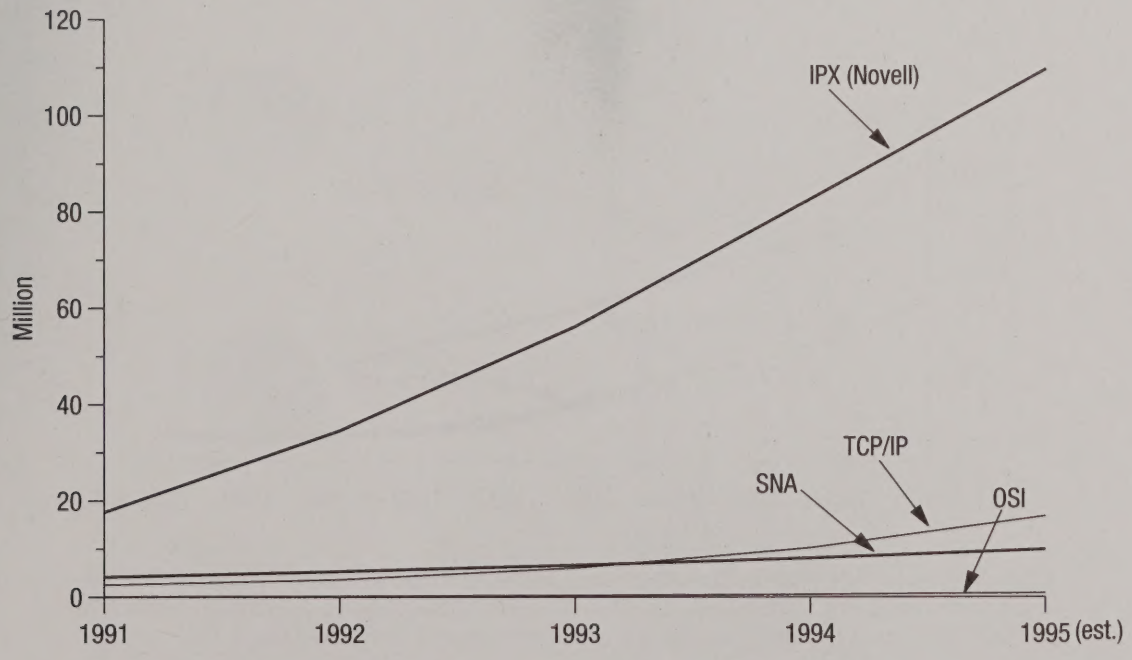
Worldwide Modem Shipments by Speed, 1980–1992



Almost two-thirds of all modems sold worldwide in 1993 will be 9600 baud or faster.

Source: International Data Corporation, 1994

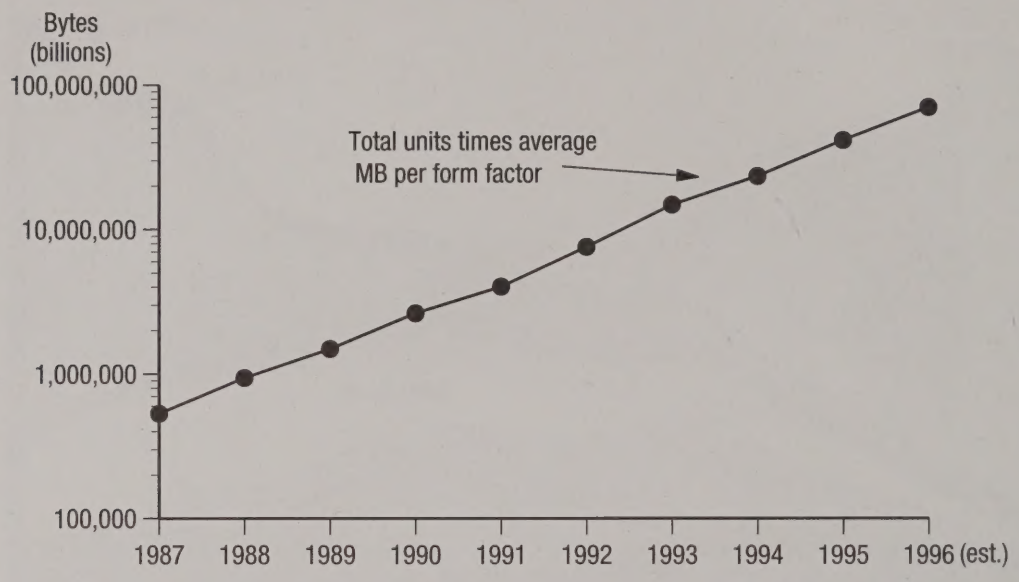
Worldwide Installed Base of Network Nodes, 1991–1995 (est.)



Despite the huge interest in TCP/IP, Novell's IPX remains the most widely-used architecture for connection to a network.

Source: International Data Corporation, 1994

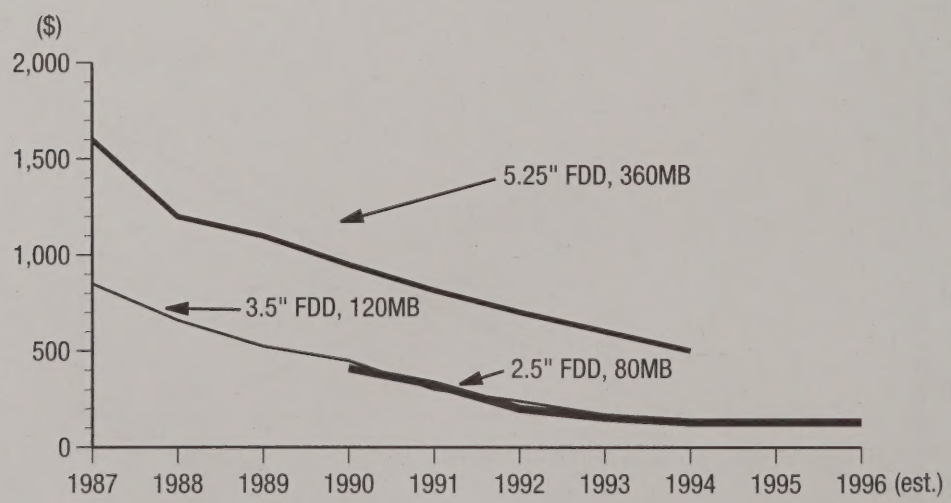
Storage Explosion: Worldwide Captive and Noncaptive MB Shipped, 1987–1996 (est.)



The growth of the storage business is one good measure of the speed of change in the IT industry. This chart shows the exponential growth of all magnetic disk storage capacity projected for a ten-year period.

Source: International Data Corporation, 1994

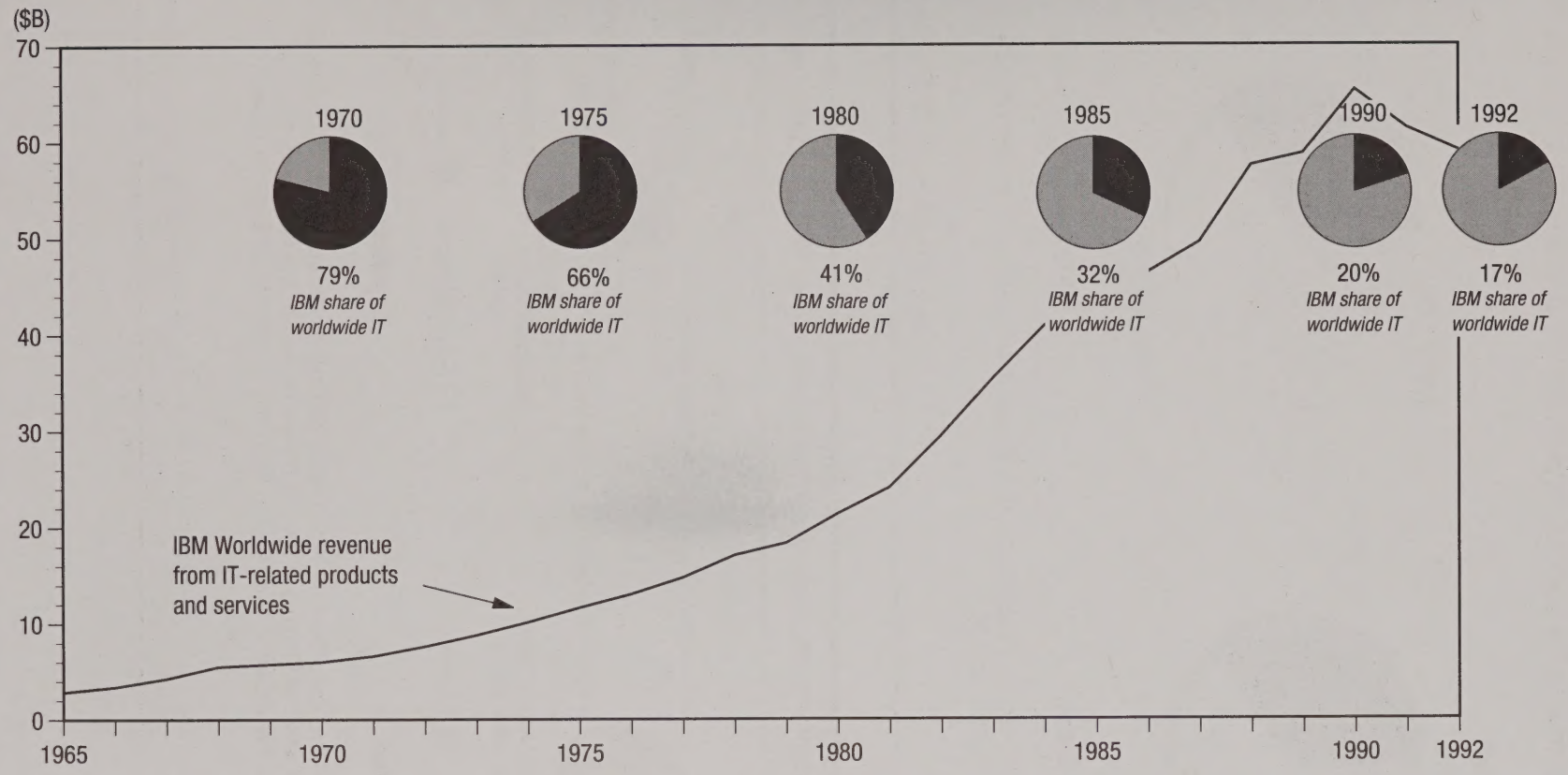
Dramatic Price Declines: Average Prices of Selected Hard Disk Drives, 1987–1996 (est.)



While the technology of data storage and retrieval may not have made as dramatic performance improvements as other technologies, prices continue to decline steadily. Real cost per megabytes has dropped at least three-fold since 1987.

Source: International Data Corporation, 1994

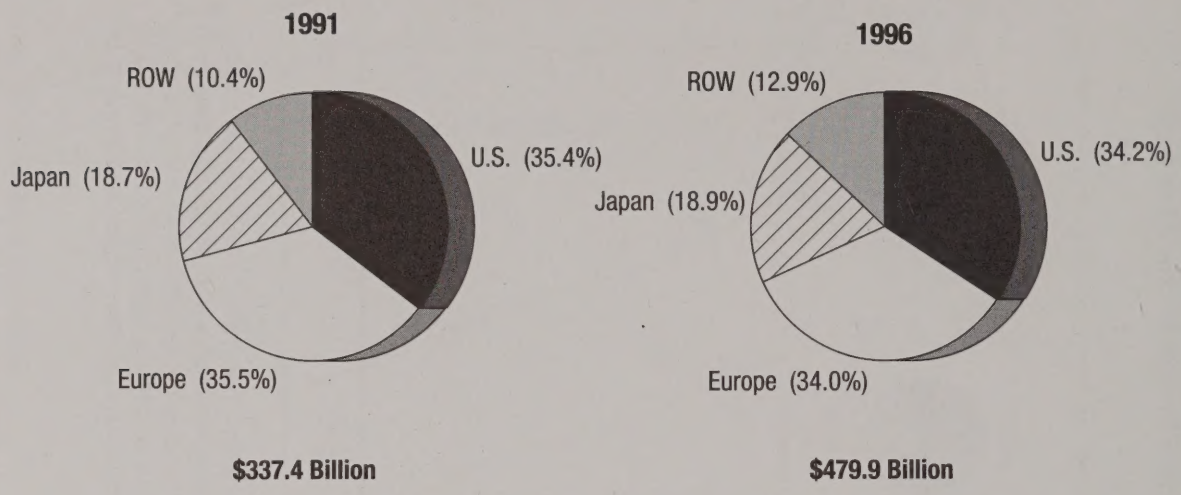
IBM's Information Technology-Related Revenue and Overall Worldwide IT Market Share, 1965–1992



IBM is no stranger to declining market share. Even before the disappointing results of the past two years, IBM has seen its influence in and dominance of the worldwide IT industry dissipate. A scant eight years ago IBM was responsible for almost one-third of the entire IT industry. Twenty years ago it accounted for three-quarters of the industry, and it drew the attention of federal regulators, who gave serious and expensive consideration to mandating the divestiture of certain lines of IBM's business. For comparison, Microsoft's current share of the worldwide desktop operating system market, by far the largest, is estimated at over 90%.

Source: International Data Corporation, 1993

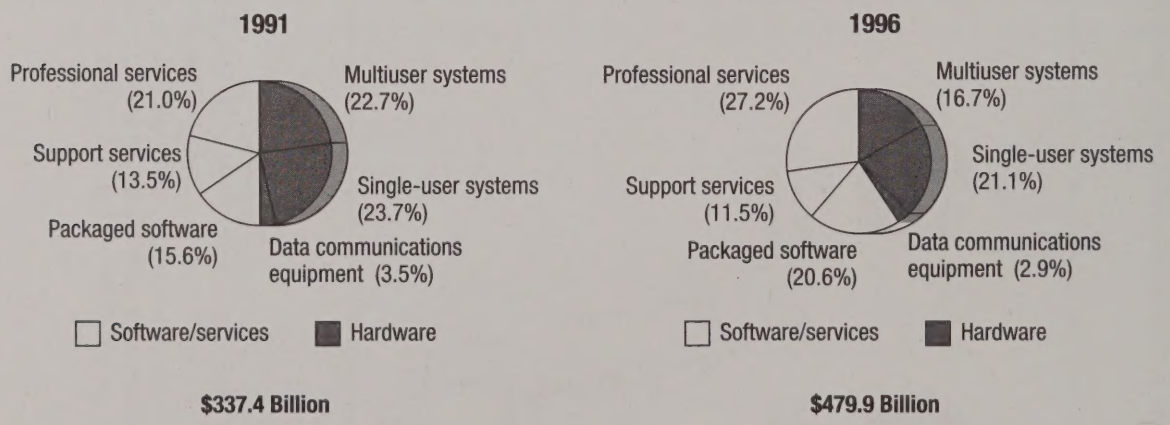
Worldwide IT Market by Region, 1991 and 1996 (est.)



By 1996 developing-country markets for IT are expected to account for almost 13% of the total worldwide IT market.

Source: International Data Corporation, 1994

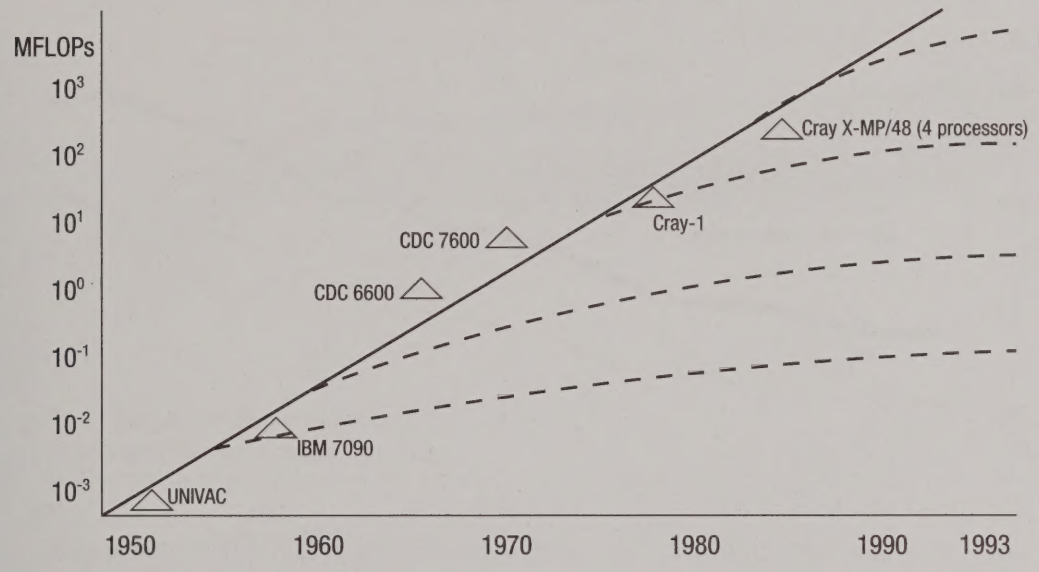
Worldwide IT Market by Hardware/Software Categories, 1991 and 1996 (est.)



By 1996 hardware is expected to shrink to only 38% of the entire worldwide market for IT. Professional services and packaged software represent the two areas of greatest opportunity in the industry. They will go from 36% in 1991 to 47% of the market in 1996.

Source: International Data Corporation, 1994

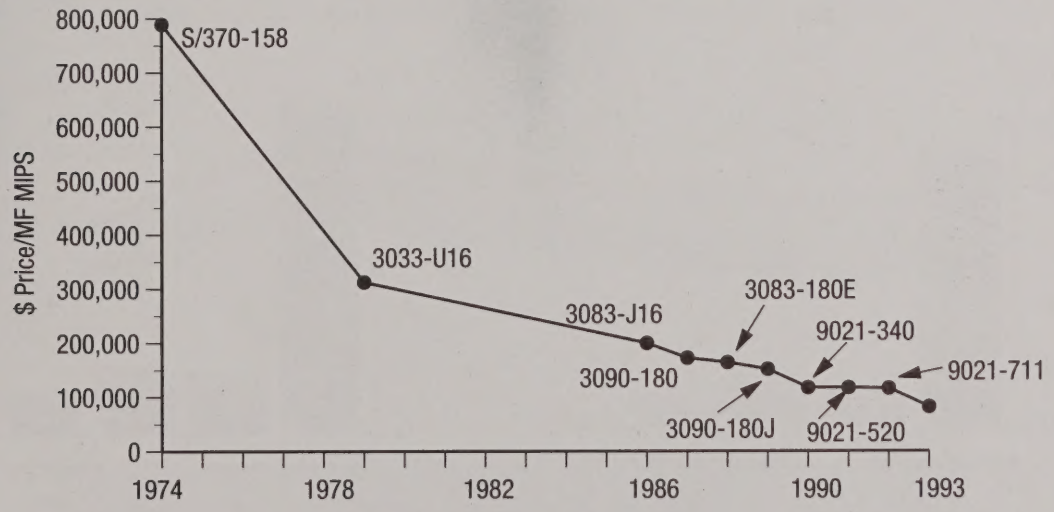
Beyond Sequential Processing: Parallel Machines May Provide Next Big Performance Jump



Sequential processing systems continue to make huge leaps in performance, but may soon meet a practical limit somewhere near 1,000 MFLOPS. Parallel processing technology may boost a new class of systems over these limits.

Source: International Data Corporation, 1994

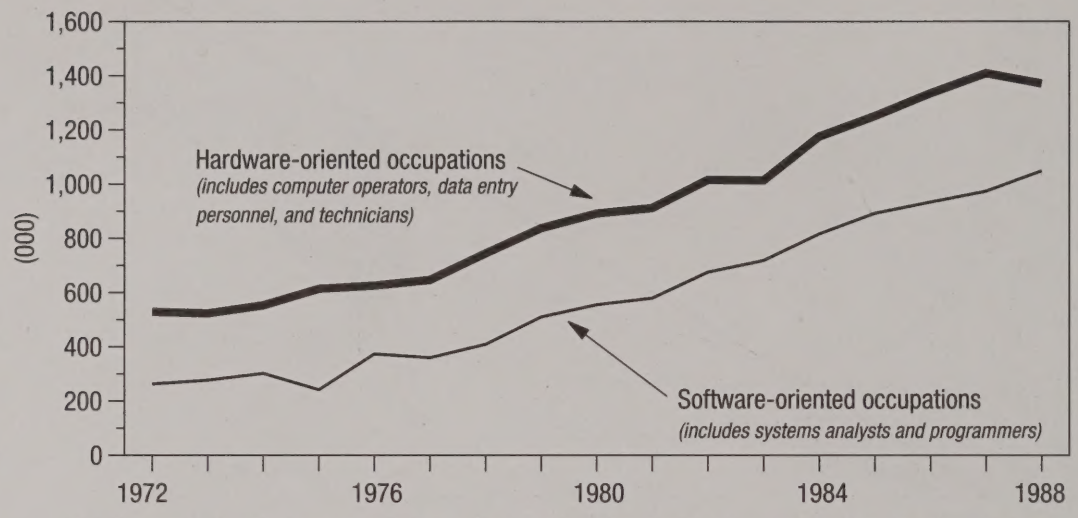
The Plunging Price of Mainframe MIPS



The average street price (i.e., after discounting) of MIPS has declined by over one-third in the past ten years. However, during that period microprocessor performance has grown far more quickly. As a result, compared to the more-rapidly declining cost of microprocessor-based computing, mainframe MIPS appear to have held fairly steady for over a decade.

Source: International Data Corporation, 1994

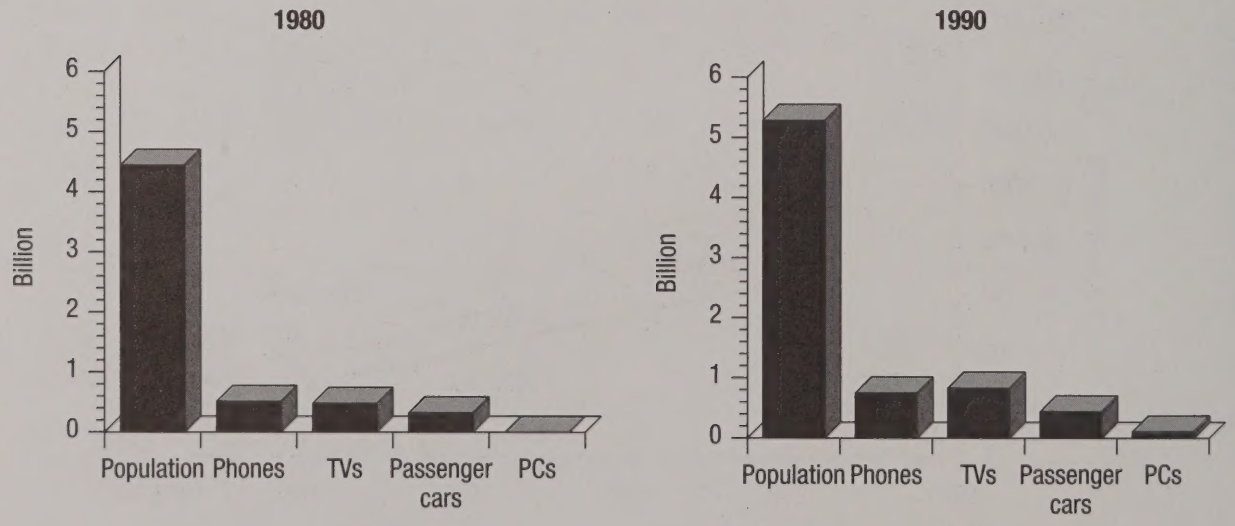
Employment in Software- and Hardware-Oriented Occupations in U.S. User Organizations, 1972–1988



Hardware-oriented occupations and software-oriented occupations have shown similar rates of growth between 1972 and 1988. The recent narrowing of the gap is likely to continue as systems software becomes increasingly complex and as the number of software applications grows. In addition, automated data entry and more reliable hardware are eliminating some traditional hardware-oriented jobs.

Source: International Data Corporation, 1994

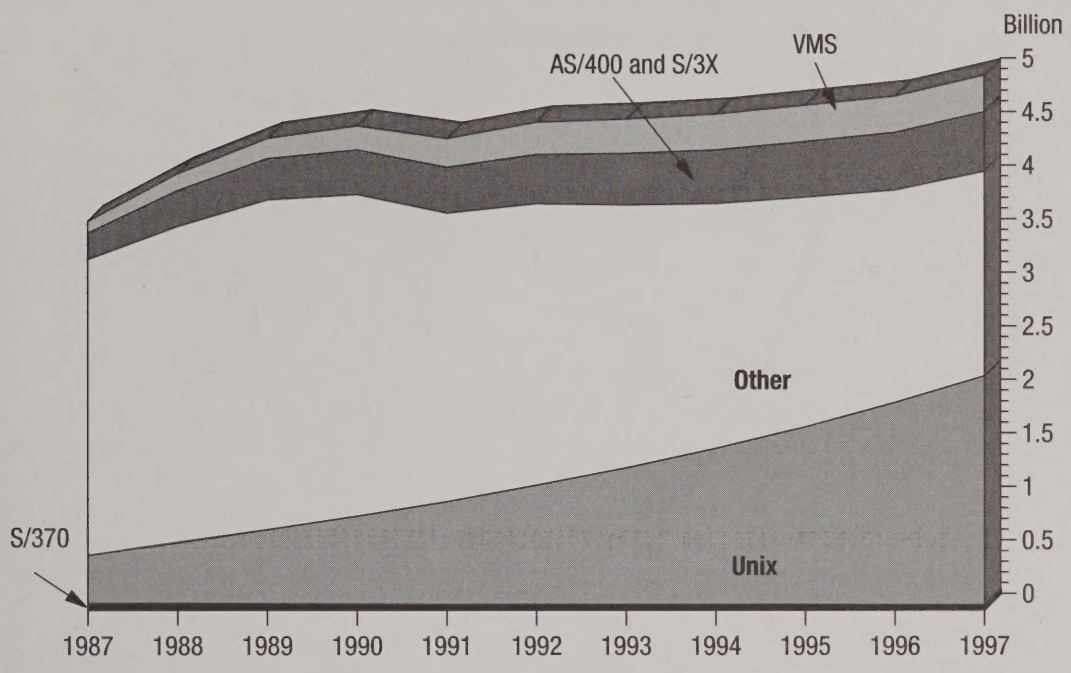
Population and Communication Technology Penetration: A Wide Gap Narrowing Slowly



PCs are still used by a far smaller percentage of the worldwide population than television and telephones. PC penetration is closer to passenger car penetration than to its electronics brethren. Even if current PC penetration rates are doubled, the 2000 chart will still show a wide gap between the three technologies. Of perhaps even greater interest, however, is the wide gap between all technologies and the total population.

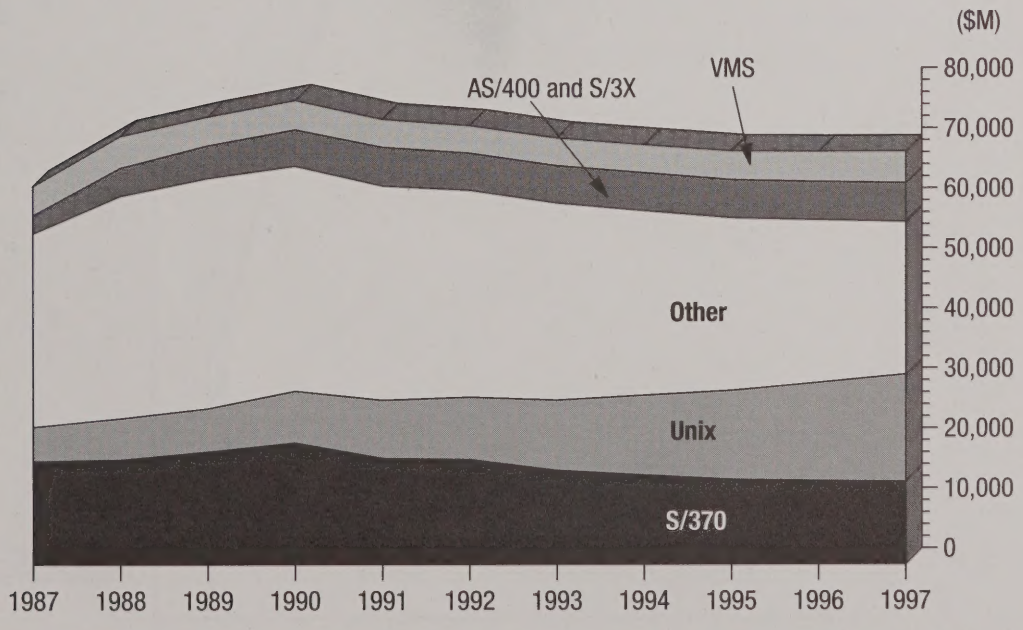
Source: International Data Corporation, 1994

Worldwide Multiuser Systems Installations, 1987–1997



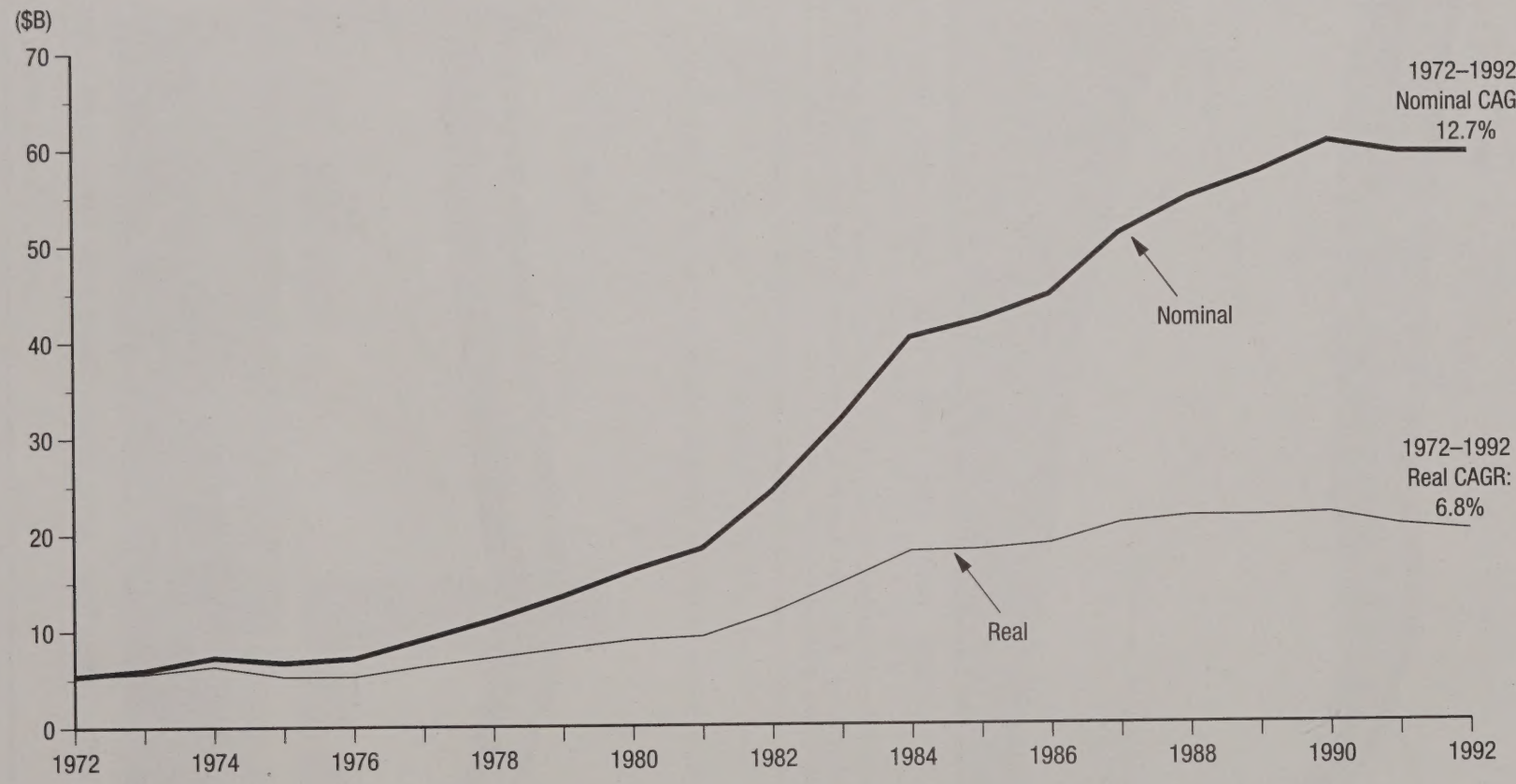
While IBM mainframe systems account for only a tiny portion of worldwide multiuser system sites (above), they account for a significant proportion of overall spending on computer systems (below).

Worldwide Multiuser Systems, Value of Shipments, 1987–1997



Source: International Data Corporation, 1994

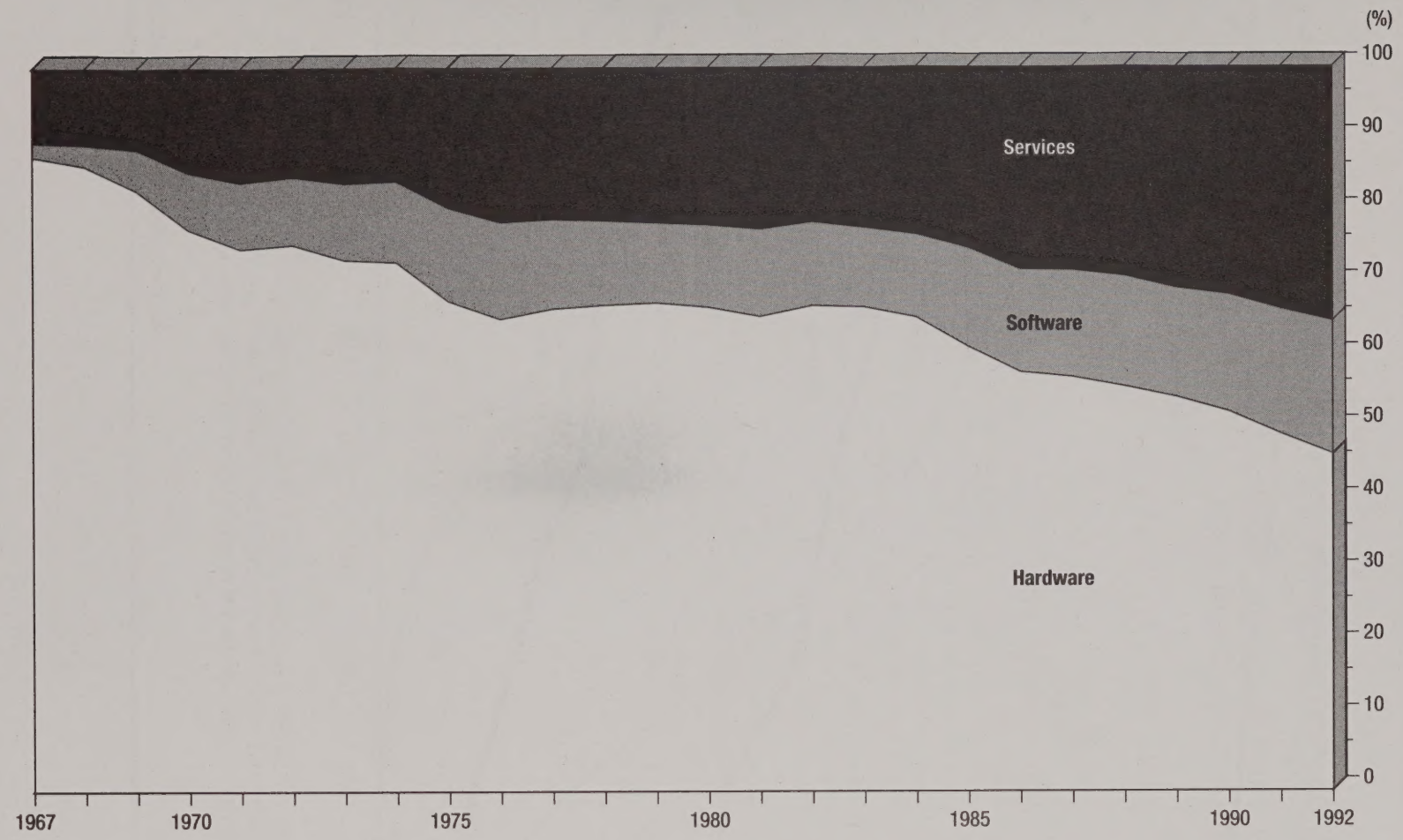
Real and Nominal Growth of the U.S. Hardware Market, 1972–1992



When corrected for inflation, the U.S. hardware market has grown by a compound annual rate of only 6.8% since 1972.

Source: International Data Corporation, 1993

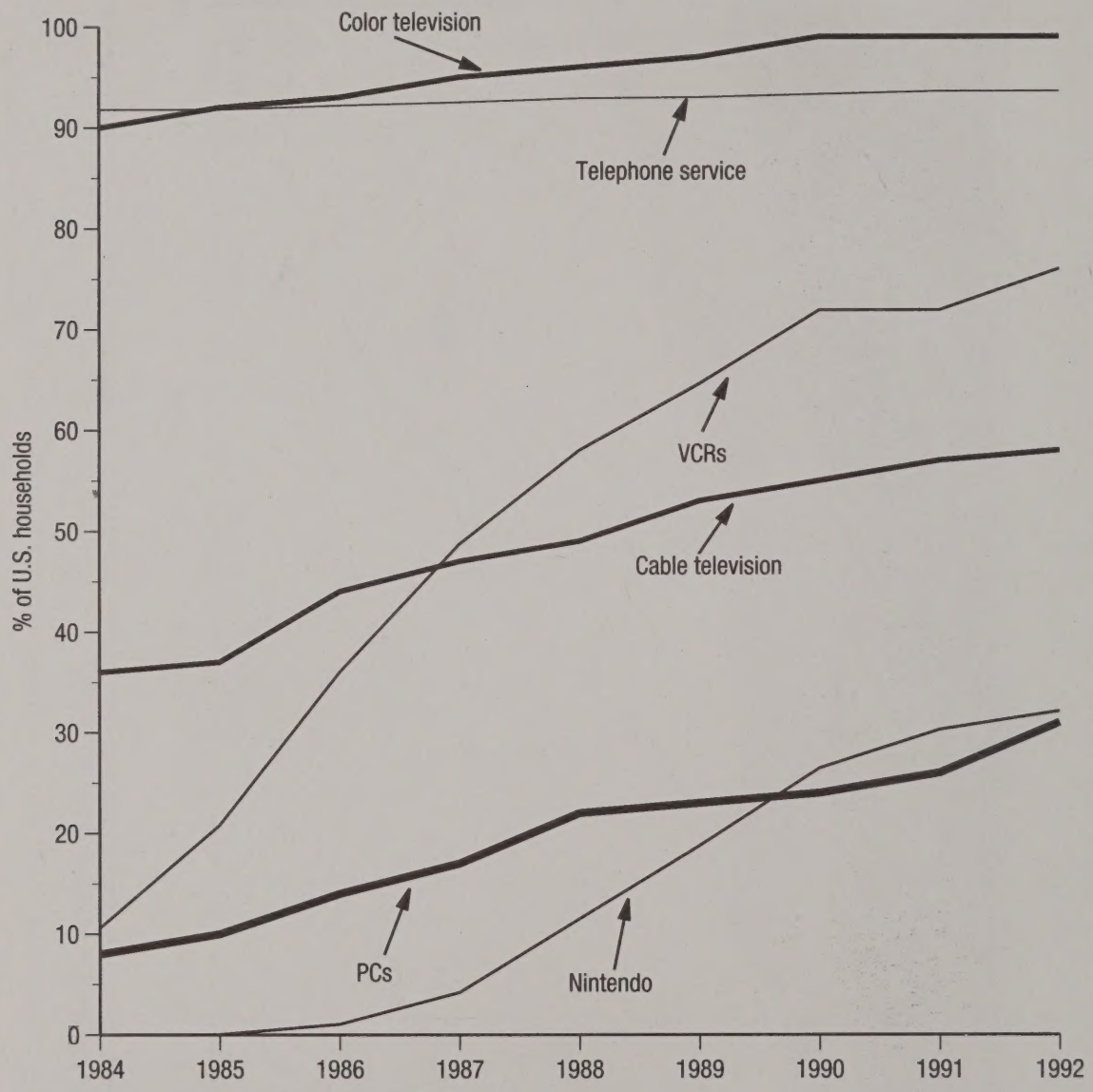
United States IT Market by Major Category, 1969–1992



Spending on hardware has been a steadily declining component of the overall U.S. IT market since 1969. Software and services now account for a majority of the total market in the United States.

Source: International Data Corporation, 1993

Penetration of Major Electronic Media in the United States, 1984–1992



PCs and Nintendo — two precursors to "interactive" media — still lag far behind traditional media penetration in the United States. Even if penetration rates grow as quickly as the VCR, neither will reach telephone/television-like ubiquity soon.

Source: International Data Corporation, 1994

Thirty Years of Change, Part II:

A Review of Analysis and Comment from *The Gray Sheet's* Archives

A review of *The Gray Sheet's* 30 years of predicting, leading, and following the twists and turns of the EDP-computer-IT industry is a fascinating tour. In 30 years the industry has grown one hundredfold from under $4 billion in annual user spending to a projected $400 billion this year. The number of companies making computers, software, and computer components has grown from a dozen to many thousands.

The computer industry has become, in terms of employment and productivity, one of the most important sectors of the worldwide economy. It has injected more sheer wealth and vitality into the worldwide economy than any comparable industrial sector. And it has outgrown, and continues to outgrow, nearly every other sector of the economy — often by a startling margin.

Perhaps even more startling is the degree to which the computer revolution is a people's revolution. In 1964 computers were only beginning to touch people's lives . . . and then in only very oblique ways. They were used by a select group of highly trained professionals numbering only approximately 140,000. By 1971 the number was up to one million people — most of them still using centralized IBM systems.

In 1978, when the first PCs were developed, about seven million people around the world were directly involved with computers. By 1985, 50 million people around the world were using computers, and now approximately 450 million people around the world are involved with or use computers in some capacity.

In an effort to summarize some of the changes *The Gray Sheet* has witnessed, we have undertaken a brief review of the 700 issues of this newsletter. Throughout this exercise we have noted the consistency with which certain themes appear:

- Architectural life cycles and technological replacement. In 1964 IBM was poised to release a major new hardware line, the S/360, that was largely incompatible with its previous products. Balancing existing, profitable lines of business with threatening new technology remains one of the most daunting management challenges. Failure to do so has led to the decline of dozens of seemingly invincible hardware and software companies.

- The need to protect IT investments. In 1976 Digital Equipment Corp. rolled out a series of new systems that allowed users to scale software development investments further than ever. Today, a fundamental attractiveness of client/server architectures is their likely scalability.
- Establishing value for nonhardware products. In 1967 the industry was struggling with the problem of how to get customers to attach value to intangible products like software and service. Pricing information, services, and intellectual property remains one of the industry's most significant challenges.

Plus ca change, plus la meme . . . or, the more things change, the more they stay the same. Even in the industry that cannot stand still. Despite the inexorable march of technology, the challenges of making, selling, and using IT products have remained surprisingly constant over 30 years.

Sometimes the rapid-fire pace of technological change obscures that consistency. In the rush to embrace new visions of a multimedia world, and as spending on new IT products rises, there is much to be learned from a quick look backward. As the industry enters a period of, potentially, even greater change than ever before, balancing pragmatism with zealous excitement becomes harder and harder. Perhaps the comments in the following pages about a variety of new paradigms, business models, products, and eras from the past 30 years will help to put the challenges at hand in a better light.

The following excerpts are reprinted exactly as they originally appeared in *The Gray Sheet*. Where context or background are necessary, we have added comments. Some excerpts have been bridged with ellipses (. . .). Enjoy. Congratulations. And good luck.

March 23, 1964 — Volume 1, Number 1

Unofficial estimates given to us by a marketing spokesman at IBM's Data Processing Division indicate that IBM expects to install 5,000 units of its as yet unannounced new computer series in the next five years.

In fact, over 25,000 S/360 systems were in use by April, 1969 . . . !

April 15, 1964

One of the most attractive features of the System/360 to users may prove to be a major competitive handicap to IBM, i.e., the basic instruction set that operates on all System/360 processors. This offers other hardware manufacturers the opportunity to develop a series of computers designed to utilize the same or a similar set of instruction codes and therefore benefit from the massive programming library that IBM is developing for the System/360. Without having to bear the sizable expense of developing a comprehensive software package for its computers, a manufacturer offering a computer with the same instruction set as the System/360 might well find that he could price his machine considerably under equivalent models of the System/360.

April 30, 1964

DEC unwrapped its newest computer, the PDP-7, at the recent SJCC . . . the computer features a 1.75 usec. memory cycle time and 4.4 usec. multiply time for about $72,000 (18-bit word, 8K core). It should be a strong competitor in the small scientific computer market . . .

July 15, 1964

An innovation in solving shortage of programming manpower during major system development work at computer installations is being offered by a new firm, DATAtemp Inc. of New York City. They maintain a staff of experienced programmers who are available on a daily or monthly basis. With over 1,000 computers in the New York City area, and frequent "crash" programming jobs in progress, the service sounds like a bright idea.

September 28, 1964

The future continues to look positive for DEC, and there has been considerable speculation about the possibility of a public offering of DEC stock. Although DEC President Kenneth B. Olsen has publicly expressed several times a distaste for selling stock to the public, we have learned that the company is preparing to publish publicly for the first time an annual report, which should be available by mid-October. This suggests that those who are anxious to invest in DEC may well have the opportunity to do so by mid-1965.

1964

Incompatibility among computers has resulted in needless duplication, delay, and waste — both to the manufacturer and the user — in terms of cost, in equipment, in operating efficiency, and in manpower and skill.

June 15, 1966

Approximately 58% of all computer systems currently on order are members of IBM's S/360 series, according to an analysis of the latest EDP/I&MR Monthly Computer Census.

How would you rate IBM's software and programming support in light of your expectations for it? . . .

Four of five [S/360-20] users questioned rated software as "excellent" or "very good." Some sample comments include: "As far as software is concerned, they're (IBM) in a prehistoric time." In speaking of the delay for PL/1, one user stated that he had given up waiting for it and now he doesn't really care when it is made available.

July 28, 1966

IBM's share of the total U.S. computer market declined just over a percentage point during 1965, dropping from 75.0 to 73.7% by year's end.

September 15, 1966

Twenty-two USSR-made MINSK 2/22 digital computers are being shipped to Czechoslovakia this year. However, the software promised with the systems has not been completed on schedule and is not available. So the Czech importer managed to wrestle a 28% discount from the Soviets in the price of the equipment. Many a U.S. user wishes he could do as well in a similar situation.

1966

This year confirms that a firm doesn't have to have the most advanced computers in order to capture a profitable share of the market.

March 15, 1967

That long-awaited phenomenon — packaged, off-the-shelf software — is finally emerging as a commercial reality in the computer marketplace.

Later, same issue:

Few if any people in the computer industry really know how to evaluate and justify software. It is, therefore, difficult for

the seller to price his wares and hard for the potential user to justify them. In most cases management has traditionally considered software a no-cost item and cannot yet see why it should buy it. The problem, thus, is one of education; time and exposure may prove to be the best teacher in many cases.

October 31, 1967

In the stock market lately, with so many investors eager to overbid for computer-sounding issues, there are many examples of remarkable stock performance, especially among the rash of new issues. Some of the rapid rises have been based largely on whim, some on undersupply, some on realistic situations perhaps boosted by one of the other factors. One of the best examples of the last — though with many of the earmarks of the other categories — is Digital Equipment Corp.

1967

Every individual income tax return is now going into a massive computer file. The only way a person can avoid paying income tax, the IRS asserts, is not to make any income.

July 31, 1968

Following two "catch-up" years of staggering growth, it looks as if the computer industry has settled down to its normal, long-range explosive growth rate of between 16% and 17%.

1969

The scope of IBM's unbundling was very broad indeed. The reduction in price, however, was very slight. Read IBM's announcement to mean a quite steep increase in users' data processing costs.

May 16, 1969

The following review of one of the earliest computer shows will resonate with anybody who has witnessed Comdex. To our 1969 editor: ditto, 25 years later:

It's very refreshing when newspapermen, who must cover a wide variety of subjects, capture the real essence of a story that more technically oriented journalists find a challenge to grasp. This was the case at Spring Joint, in Boston. We feel no reason to attempt a better description:

A 21st century carnival. A light show. Public relations run amok. A taste of the breakdown that may face an overpopulated world.

The Spring Joint Computer Conference in War Memorial Auditorium is all those things.

The Auditorium is a midway. The barkers are female, miniskirted, with cleavage. They schill for $100 million worth of the latest in computer and related equipment that cost its manufacturers hundreds of thousands of dollars to display.

There are colored lights, gas-filled balloons on strings, and buttons that declare their wearers to be "compatible" and more. There are hot dogs and hamburgers and a hospitality suite around every corner.

It is the show that brings out 5000 representatives of the industry and 15,000 "others" — buyers, scientists, engineers, radicals, students, rubbernecks. Often it seems as though everybody is a public relations representative . . .

Come up to breakfast, to brunch, to lunch, for cocktails, to dinner. Be our guest at Pops at the Playboy Club, come up to the room and have a belt and let's talk about our new analog to digital time-sharing compatible disk pack readout that is the fastest, biggest, cheapest, easiest to operate little 'ol' thing you ever saw.

Not a chair anywhere in the Auditorium where it is wall to wall people. Weary, glassy-eyed conferees roam the corridors of the Sheraton looking for an empty sofa. But they are all taken by slack-jawed sleepers who have had it.

Try for an elevator, and wait . . . wait . . . wait. Shout for a taxi, and shout in vain. Not a cab within four blocks of the Prudential Center and the traffic is congealed, anyway. Every restaurant from the waterfront to Framingham has hungry customers stacked up. Not a hotel room to be had for 55 miles.

— Donald White, *Boston Globe*

June 16, 1971

The computer industry being what it is, the calculation of negative growth rates is a seldom-used technique, and EDP/IR had to refer back to the textbooks while examining the custom software markets

Later in that same issue:

The trouble with "software" companies, however, is not always software sales. Most of them have diversified into higher-level consulting and research, or into computer-based services, and sometimes it is the diversification that backfires, with a bang.

December 31, 1973

How do you break IBM up without destroying the computer industry?

The easiest way to start a conversation with anyone who even thinks he knows something about computers or the computer industry is to ask THE QUESTION, posed above. EDP/IR doesn't know the answer . . . hasn't heard one that holds water.

. . .

Just as we think 1974 may be the year in which computer communications seem certain to see radical improvements and less regulatory intervention . . . we begin to wonder if it could also be the year in which — somehow — all the legal entanglement begins to disappear from the information processing industry. Maybe, somehow IBM could figure out a way to preserve justice, protect stockbrokers, prevent its "bank" from being siphoned away . . . and above all permit computer users — soon almost everyone — to take maximum advantage of what is without doubt one of mankind's most powerful inventions?

July 30, 1974

"The easy things in the computer field have been done. It is much simpler to develop computers than to apply them effectively" — William C. Norris, CEO of CDC

June 19, 1975

IDC estimates that at yearend 1974 there were 820,000 keyboards in use in the United States.

January 15, 1976

"What you really want to do in a new product," asserted a DEC speaker at the [DECsystem 2040 introduction] press conference, "is give them new hardware but old software. Tried and true stuff."

September 22, 1977

The information highway, 1977

The introduction of sub-$600 computer systems . . . has suddenly made personal computers attractive as a home utility and as a source of entertainment. This user segment has tremendous market potential if/when the devices can be used as interactive receiving sets . . . . Indeed, the brightest prospect for the home computer lies in its use as an information appliance (for online for access to outside resource material and databases), and because this utilization will require telephone link-ups, it is likely that AT&T will direct some attention to this market.

September 15, 1979

The first portable PC:

IBM introduces the first portable desktop (and take-home) computer, the IBM 5100 . . . weighing in at 50 lbs., carrying case available.

It's a humdinger. Though IBM is mass marketing the system to rope in first-time users, the system could easily carve some business out of the timesharing industry . . . while turning the market for large, programmable calculators into a whole new ball of wax.

March 12, 1979

It looks as if the new decade will bring with it a quantum leap in computing power — thanks both to feats of hardware technology and software efforts,

particularly in making computers easy to use. . . . "Far out" technologies are coming, according to their proponents. Josephson Junction will be in commercially available products in 1984 . . . . Ovonic memories, or those consisting of amorphous film, should find their way into optical computers as well as some current devices on the market.

August 14, 1984

Nineteen eighty-four may be remembered as the year the software business got nasty. Inflated vendor claims and heavy advertising have combined with layoffs — Visicorp, Micropro, Condor Computer, Software Arts, and Ask Micro — and falling earnings to shake both user and venture capital confidence. Additionally, the industry (other than Microsoft) has been largely unable to develop successful follow-on products.

Later in that same issue:

MICROSOFT TOPS $100 million mark. For its fiscal years ending June 30th 1984. No one customer accounts for more than 10% of sales.

August 31, 1984

Microsoft is steadily working toward compatibility between MS-DOS and Xenix . . . A stated future goal is binary compatibility . . .

October 25, 1984

What it all adds up to is simple. As far as traditional mainframe architectures go, the race for improved price/performance is quickly coming down to IBM vs. Japan (Fujitsu, Hitachi, and NEC).

About two years ago it was common industry wisdom that IBM and the other mainframe companies would out their emphasis on building fully compatible product families, offering large customers integrated and distributed solutions. The most common example of this was the expectation that IBM would act quickly to resolve the overlap between its S/38, 4300, S/36, 8100, and S/1 systems.

Suffice to say that this has not happened at all. Because of their desire to maintain profitable product lines and because of their need to get into new markets, the traditional mainframe companies are bringing in all sorts of new boxes without necessarily imposing stringent compatibility requirements.

April 23, 1985

Mark Twain once warned against assuming that trends could be extrapolated, indefinitely, without concern for context or common sense. The Mississippi, he noted, was 242 miles shorter than it had been 176 years earlier. At an average shrinkage rate of 1.3 miles/year, "any person can see that 742 years from now the Mississippi will be only a mile and three-quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and mutual board of aldermen. There is something fascinating about science. One gets such whole sales returns of conjecture out of such a trifling investment in fact."

The computer revolution has been so sudden and mind boggling that industry watchers tend to become science fiction writers, often with good reason. But Mark Twain was right: we do need a reality principle in place before we simply extrapolate current trends and expect future growth rates to replicate or surpass today's frenetic pace. For example, utopians who thought that the information industry could avoid business cycles have recently been chastened. And there may be other barriers along the Silicon Marathon that might keep finishing times a little slower than many participants are now anticipating.

The problem is determining just what are the parameters of the MTE (Mark Twain Effect) in particular cases — that is, what are the barriers of context or common sense that can throw extrapolations seriously off target, like the fact that the Mississippi can't get shorter than the perpendicular distance to the mouth.

March 29, 1985

If the announcements on March 26 do not quiet all doubts, they do offer the first tangible evidence that AT&T can become a major force in office automation. Maybe not today, since the advertising line, "The Computer with the Future Built In," means that even AT&T admits the market is not there yet. But AT&T strategists believe it will be, and if their bet pays off, their new products demonstrate the technology to make it pay off big.

. . .

The 7300 Unix PC is a computer phone, telecomputer, voice-data system, or whatever, with hardware that allows simultaneous transmission of voice and data plus especially impressive phone management software that manages the two.

. . .

And it is Unix, of a sort — an enhanced System V . . . after all of the talk about standardizing Unix, AT&T has complicated the picture even more with a new variant. . . . Hence the would-be Unix unifier AT&T is advising VARs and software manufacturers to prepare two versions of every Unix PC program, windowed and windowless.

September 11, 1987

Life begins at 30, or so Digital has reasons to believe. But what happens then?

Thirty years ago, General Georges Doriot, the Harvard Business School guru who died on June 2, provided seed money from his American Research and Development Corp. (the first non-family-owned venture capital company in the U.S.) to enable a young researcher/entrepreneur named Ken Olsen to found a computer company. Digital's adolescence was marked by many highs and its share of lows, but today the company has come of age as the multiuser alternative to IBM.

February 19, 1988

IBM restructured because Armonk, after years of denial, finally realized that it has a real problem on its hands. Things aren't, nor are they soon going to get, significantly better.

The Next 30 Years

"We will not anticipate the past; so mind, young people — our retrospection will be all to the future"

— Richard Brinsley Sheridan, 1751–1816

The not-unpleasant distraction of reviewing 30 years of the information-technology industry is a good way of shedding light on the future. The next 30 years will be filled with a similar level of discontinuity and drama. Many questions and challenges from the past will be repeated. In addressing them every bit of historical perspective will help.

What are the technologies that will rock the industry during the next 30 years? Many of the most important (and certainly the fastest growing) will revolve around consumer computing or mass computing. The depersonalization of the PC and the growth of wireless information services are two examples.

Network intelligence will slowly chip away at PC users' attachment to their PCs. Instead, the value for PC users will lie in their data on the network. Local processing and storage will migrate to the network (where they're better handled anyway). The value of any individual computer (PC, minicomputer, super computer, or mainframe) will become a function of its network access.

PCs will become true commodity items — given away by information service suppliers. These units will become as disposable as pocket calculators (an evolution that took almost 50 years). Razor-thin hardware margin will stand in stark contrast to service- and transaction-providers' more lucrative commission structure. Tremendous market share and power will accrue to vendors who embrace this ubiquity of computing as a liberating concept, rather than propagate illiteracy (read also: inability to communicate) as a control mechanism.

In addition, the growth of information services will stretch the concept of applications and data. Data and applications will become indistinguishable from each other. Software without data will become obsolete. Likewise the corollary.

What does this mean for the industry? For one, a new class of services companies will rise and will serve a similar function to today's publishing companies. These former publishers will become the outermost end of the IT value chain. They will add value by customizing the network experience to individual tastes.

For another, companies will need to become even more adaptable. Over the next 30 years getting in and getting out of a platform or product will be critically important. Commitment to a specific ideology can quickly foster a stifling groupthink disorder.

One cycle is clear: prospering in successive technology waves is very difficult. It wasn't until the AS/400 that IBM got the minicomputer right. Digital has never been a leader in PCs.

It's the same with software, too. Consider Cullinet and Lotus. Microsoft is only now facing its most significant challenge. It is trying to replicate the success of DOS (Windows has really just been an extension). History has shown that the odds are stacked against Microsoft. It is a challenge that every other IT supplier will face sometime in the coming years.

IT suppliers will need to balance two often incongruous qualities for continued growth. An ability to impart a vision for how customers can protect their investments remains tantamount. Doing so without clinging to doomed models, architectures, or world views is the hard part. But there is really no other course for established or growing IT companies alike.

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HOW THE COMPUTER BUILDERS WILL DIVIDE THE $225 MILLION GOVERNMENT PURCHASE OF EDP EQUIPMENT...PAGE 6

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM EXPECTS TO INSTALL 5,000 OF ITS NEW COMPUTER SYSTEMS IN NEXT FIVE YEARS

Unofficial estimates given to us by a marketing spokesman at IBM's Data Processing Division indicate that IBM expects to install 5,000 units of its as yet unannounced new computer series in the next five years. This number represents a cumulative purchase cost of over $3.5 billion. First models of the new computer series are expected to be installed in the summer of 1965. The smaller computers of the series will be installed first, with the larger machines scheduled for delivery early in 1966.

The announcement date for the new series is expected on or about April 7th. The main features of the family of computers will be:

- equivalent processing power at about one-half the cost of 1400 and 7000 series computers.

- a compatible, integrated series of binary machines. The word length for the larger machines will be 64 bits, while 32 and 16 bits will probably be used on the smaller members of the computer series.

- a range of rental prices starting at $2500 per month and going up to $120,000 per month for the giant member of the series.

- the use of hybrid circuitry (active circuit elements deposited ona substrate containing passive elements) in the processors of the new series, reducing it to one-sixth the size for equally powerful transistored CP's.

- the processing units will operate in a byte-by-byte mode. Data to be processed will be transmitted to high-speed micro-ferrite core memories (size = 1 to 4K; cycle time = .3 usec.) where the control unit will select the data character by character and forward it to the processors. The flow rate of bytes through the processing units will be about 3.3 million per second. A byte is a group of bits used to encode a character. The byte size for the series will probably be eight bits.

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- a multiply time for a 64 bit word of about 2.0 usec, compared to 8 usec. for the 36 bit word of the 7094.

- the series will operate in the newly accepted standard code for data transmission, ASCII.

- FORTRAN and COBOL compilers can be expected to be available for the machine at the time of first installation. ALGOL will be ignored.

- availability of large, random access memories for the series at a significantly lower cost per bit than currently available. Some of the units will be semi-permanent photo-optical memories for storage of frequently used compilers, decisions tables, dictionaries, etc.

Assuming that the new computer series will be installed on a 40% purchase/60% lease basis, the income expected by IBM from the new series is estimated to be:

Year	Total Number of Systems Installed	Approximate Income
1964	---	$ -----
1965	100	3,500,000
1966	1,400	250,000,000
1967	3,000	650,000,000
1968	5,000	950,000,000

Of course, these figures do not include the income from the existing population of IBM computers on lease and new installations of the now familiar 1400 and 7000 series computers.

These income expectations will be greatly affected by the moves of IBM competitors in the highly contested computer market.

EFFECT ON COMPETITORS

The competitors now making the most of IBM's current weaknesses in the electronic data processing market are Control Data, UNIVAC, and Honeywell. Control Data's 3600 has been able to take away some "natural" 7094 orders, and its super-scale 6600 computer has been able to evidence a computing capacity superior to any IBM had available. Control Data's recently introduced 3200 and 3400 computers, scaled down versions of the 3600, are doing well. These machines are aimed at the current or potential users of IBM 1410 and 7000 series computers. The new IBM machines will approximate Control Data's 3600 family of computers in computation costs, and IBM will rely on its reputation and extensive program library to give it a competitive edge.

UNIVAC has enjoyed fair success with its 1107 and III computers in competiton with 7000 series machines. It has done especially well of late in sales to the federal government of its medium scale 1050 and the card-oriented 1004.

General Electric is moving rather tardily into the 7000 series market with its as yet unannounced 600 series computers (announcement is

expected in April). However, as one of the largest IBM users, it effectively struck from within recently when it decided to replace eight 7090s used internally with its own 625 computers before the end of this year.

By far the largest population of IBM computer users is the small-scale 1400 series line. To date, over 7,300 of these computers have been installed (excluding the 1410). Therefore the success of the Honeywell 200, following its announcement last December, in attracting orders from 1400 series users must have caused some painful reflections in White Plains. At last, IBM is faced with a competent poacher in its vast vineyard of 1400 series users, for the H-200 has five times the internal speed of the 1401, with a capacity for simultaneous input-output operations, at about $1,500 less per month than the 1401 in corresponding configuration...and Honeywell is claiming a software package to automatically convert 1400 series programs into instructions for the H-200. To date, Honeywell has been able to pick up about 380 orders for the H-200, with about 200 orders coming from existing 1400 series users.

The impact of the H-200 on IBM is more phychological than real, of course. Before the early fall of 1965, when IBM will begin installation of its small-scale members of its new computer series, Honeywell will still be in relatively limited production of the H-200. Although Honeywell is expanding its manufacturing facilities in the Boston area as rapidly as possible, it cannot be expected to produce more than 200 to 250 H-200s in 1964 and about 800 in 1965. Already delivery dates on new H-200 orders have been pushed back to the summer of 1965, and Honeywell is not pressing right now for additional orders.

Will the new small computers from IBM stem the success of the H-200? As one data processing manager interviewed by EDP I&MR put it, "I have been up to Poughkeepsie and have been briefed on the new IBM series. Unless the computing cost of the medium and small-scale machines comes in materially lower than I expect, I will be sticking by my H-200 order. I think there are definite advantages to dealing with two vendors." This user currently has four 1401s installed and a 1440 and two H-200s on order.

A Honeywell spokesman commented that any new IBM computer in the $3,500-$4,500 per month range cannot be expected to be significantly lower in processing costs than the H-200. He noted that in the $2,500 per month range, IBM has a definite edge because of the low cost lines of peripheral equipment it manufacturers. However, for systems between $3,000 and $5,000 per month, the Honeywell spokesman feels that the processing speeds of the H-200 will be competitive with the new IBM series.

The most significant thing about the H-200 to IBM, no doubt, is that its success encourages other computer manufacturers to invade more deliberately the 1401 replacement market. This effect was not long in coming. Burroughs has recently announced the availability of a program translator which converts 1400 series programs into B200 series programs. Burroughs claims that the translated programs for a card system

run 50-to-100% faster on the B200, and tape programs run 25% faster on the B200. As Burroughs DP Sales Manager V. J. Ford modestly puts it, the "availability of this translator removes the time and cost barriers to conversion to more productive systems."

General Electric has just moved strongly into the 1401 replacement field by extending its existing family of 400 series computers down to the $5,000 to $8,000 per month price range by introducing its 415 computer. For the current 1400 series user, GE is offering two months of free use of a CAPACITRIX memory, a special permanent store memory unit, which enables the 415 to simulate the operations of the 1400 computers. This is offered to a 1400 series user to "keep him on the air" while he is reprogramming his jobs in 415 instructions. To encourage the user to reprogram expeditiously GE pushes the price of the CAPACITRIX to $300 per month for the third and fourth months, $600 per month for the fifth and sixth months, and $900 per month after six months.

A minimum system configuration of the 415 with a 4K memory, card reader, punch, and printer is $4,770. A large system with a 16K memory, reader, punch, printer, and 12 mag tapes is priced at about $12,500 per month.

General Electric has been promoting the 415 to prospective customers for about one month before its announcement, and it currently has about 20 orders for the system outside of GE.

RCA is expected to come up with a new computer in the $4,000 to $6,000 per month price range sometime this summer. Industry rumor has it that RCA was setting up for an introduction in the early part of 1964, but noting the favorable reception of the H-200, RCA is delaying its announcement until it develops a 1400 series program translator for its new machine.

The effect of the new small-scale computers from IBM on these machines is not easy to judge. Since the majority of its 1400 series installations are on lease, IBM is not anxious to accelerate unnecessarily the replacement of this large pool of revenue producing installations. However, IBM recognizes the value of the good will of its customers, who are well aware of the prestige associated with buying from the manufacturer who "has the best equipment available." Also, customers cannot be expected to look kindly to IBM if they feel that it is not offering them the best value in computing equipment which it has the production capacity to make available.

Since the new IBM computer series will be using the new ASCII code, it will not be directly compatible with current IBM computers which use a binary-coded-decimal mode of operation. Therefore IBM can expect to achieve considerable revenue from basic reprogramming costs in upgrading a current computer user to the new series. The costs to the customer for this service will no doubt be determined by the cost of compatible hardware from the above mentioned competitors.

From all indications, 1964 will certainly be a turning point year in the development of the American computer industry.

A LIST OF $225 MILLION WORTH OF COMPUTERS which have been earmarked for purchase by the Department of Defense was given in a recent report to the Congress from the Comptroller General's Office. The report is entitled "Plans for Purchase of Leased Automatic Data Processing Components in Use at Military Installations" and is dated February, 1964.

A Department of Defense study described in the report indicated that the savings to the government from the purchase of the over $225 million in ADP equipment now on lease would be $65.9 million a year once the break-even point is reached (when accumulated rentals equal the purchase costs).

As of February 29, 1964, the Department of Defense has completed negotiations for the purchase of about $201 million of this equipment. The remainder of the systems will be purchased from funds requested in subsequent budgets.

The editors of EDP I&MR have summarized below the information in the Comptroller General's report to show the number and average cost for each computer system earmarked by Defense for purchase, and the expected total income to each manufacturer from this arrangement, when completed.

SUMMARY OF LEASED COMPUTER SYSTEMS AT
MILITARY INSTALLATIONS PLANNED FOR PURCHASE BY THE GOVERNMENT

Model	Number of Systems	Ave. Cost/System	Total Cost
ASI 210	1	$ 160,000	$ 160,000
B 5000	1	851,000	851,000
CDC 924 A	1	250,000	250,000
CDC 1604	3	1,063,666	3,191,000
CDC 3600	1	2,634,284	2,634,284
GE 225	4	352,570	1,410,280
H 400	1	248,741	248,741
H 800	1	1,228,098	1,228,098
IBM 305	1	534,612	534,612
IBM 1401	94	237,619	22,336,160
IBM 1410	13	765,573	9,952,438
IBM 1460	2	450,360	900,720
IBM 1620	16	98,022	1,568,355
IBM 7040	2	1,406,947	2,813,895
IBM 7044	1	2,118,000	2,118,000
IBM 7074	2	860,769	1,721,539
IBM 7080	14	2,592,792	36,299,082
IBM 7090	3	2,199,821	6,599,463
IBM 7094	9	2,895,873	26,062,863
IBM 1410/1401	10	1,315,100	13,151,000
IBM 7070/1401	1	1,325,000	1,325,000
IBM 7090/1401	3	2,436,193	7,308,580
IBM 7094/1401	2	3,134,500	6,269,000
MONROBOT XI	1	34,500	34,500
NCR 315	5	474,758	2,373,750
NCR 390	1	59,400	59,400

SUMMARY OF LEASED COMPUTER SYSTEMS AT
MILITARY INSTALLATIONS PLANNED FOR PURCHASE BY THE GOVERNMENT (Con't)

Model	Number of Systems	Ave. Cost/System	Total Cost
PHILCO 2000	2	1,878,275	3,758,551
RCA 301	5	247,551	1,237,758
RCA 501	17	428,320	7,281,445
SDS 920	1	146,500	146,500
UNIVAC III	7	1,386,000	9,702,000
UNIVAC 490	4	3,150,000	12,600,000
UNIVAC SS 80	3	360,500	1,081,500
Unidentified Computers	28		14,633,460
Punched Card Accounting Equipment			23,544,692
TOTALS	260		$225,547,567

SUMMARY OF INCOME TO MANUFACTURERS
FROM PLANNED PURCHASES OF COMPUTERS AT MILITARY INSTALLATIONS

Manufacturer		
Advanced Scientific Instruments	1	$ 160,000
Burroughs	1	851,000
Control Data Corporation	5	6,075,284
General Electric	4	1,410,280
Honeywell Electronic Data Processing	2	1,476,839
International Business Machines	174	138,960,907
Monroe Calculating Machine Company	1	34,500
National Cash Register Company	6	2,433,150
Philco	2	3,758,557
Radio Corporation of America	22	8,519,203
Scientific Data Systems Incorporated	1	146,500
Univac	14	23,383,500
Unidentified Computers	28	14,633,460
Unidentified Punch Card Accounting Equipment		23,544,692
TOTALS	260	$ 225,547,567

SOMETHING OLD VIA SOMETHING NEW FROM BURROUGHS

Burroughs has come up with a new way of selling used computers. It is taking the Model 0 B200 processors which have been returned by users who have been up-graded to the B263, 273, 283 or other system, and surrounding it with some low-cost peripheral equipment. This it is calling its new B100 computer series.

The B100 series includes a B160, the B170, and B180. The B160 is a punched card system which rents for about $2,000 per month. The B170 can use card, magnetic tape or MICR and rents for about $2,800. The B180 with six magnetic tapes will rent for just over $4,000 per month. The peripheral equipment for the series includes a 400 cards per minute reader, 475 lines per minute printer, 250 lines per minute multiple lister, and a 1,200 check per minute sorter reader. Magnetic tape units have a 24 kc transfer rate.

According to a Burroughs spokesman, the computer is immediately available for delivery, and several have already been sold, although the first official announcement of the series is not expected until this week.

SIGNIFICANT NEW COMPUTER ORDERS

American Greetings Corp.	Cleveland, Ohio	NCR 315	November, 1964
C.E.R.N.	Geneva, Switzerland	CDC 6600	1964
Certified Grocers Ltd.	Los Angeles, Cal.	1-H800, 2-H200	August, 1964
Clark Equipment Co.	Buchanan, Mich.	3-GE 215	1964
Cleveland Trust Co.	Cleveland, Ohio	IBM 1460	October, 1964
First National Bank of Boston	Boston, Mass.	H800	August, 1964
Hartford Life Insurance Co.	Boston, Mass.	IBM 7010	September, 1964
Jefferson Standard Life Insurance Co.	Greensboro, N.C.	IBM 1410	1964
Marquardt Corp.	Van Nuys, Cal.	IBM 1460	August, 1964
Martin Co.	Baltimore, Md.	IBM 1460	September, 1964
Michigan Hospital Service	Detroit, Mich.	H200, H800	September, 1964
Nationwide Insurance Co.	Columbus, Ohio	NCR 315	1964
New York University	New York, New York	IBM 7094 II	November, 1964
North American Aviation, Inc.	Downey, Cal.	IBM 7010	August, 1964
Northrop Corp.	Hawthorne, Cal.	IBM 7044	August, 1964
Southern Railway Co.	Atlanta, Ga.	IBM 7040	November, 1964
Travelers Insurance Co.	Hartford, Conn.	UNIVAC 490	November, 1964
U.S. Navy Fleet Numerical Weather Control	Monterey, Cal.	CDC 3200	August, 1964
Western Electric	New York, New York	3-UNIVAC 1004, 2-IBM 1410	1964
Yale University Computer Center	New Haven, Conn.	IBM 7094, IBM 1410	August, 1964

BUSINESS AND FINANCIAL NEWS

The Burroughs Corporation (NYSE) achieved record sales of commercial systems and equipment for the year ending December 31, 1963, although total revenue declined to $390,774,000 from 1962's $424,681,000. The decline in revenue was accounted for by a decrease in defense billings which were $48,000,000 lower than in 1962.

Net earnings of $8,509,000 or $1.22 per share were realized last year, compared to earnings of $9,492,000 or $1.42 per share on 1962's higher sales.

Burroughs research and development spending totalled $16,000,000. Capital spending for plant and equipment and for machines and systems placed on lease was $31,827,000. Cash flow amounted to $3.75 per share.

The first Japanese order for the B5000 computer system was received in 1963, and installations of Burroughs electronic data process-

ing systems overseas passed 40. These include eight 205's, four 220's, 22 E101-103's and 14 B200 series installations. Currently, Burroughs' International Division has about 18 B200 series and two B5000 computers on order overseas.

Burroughs, although often labelled as an adding machine manufacturer, has sold over $1,000,000,000 in electronic products since 1950. Included in this figure are over 900 electronic computer systems. Over 300 of these deliveries are military computers. These include 157 ground-based SAGE, 36 airborne SAGE, 34 BUIC, and 17 ATLAS system computers. Also, three B825's have been delivered to date. For a list of Burroughs' commercial computer installations, see the computer census this issue.

Sales of the National Cash Register Company (NYSE) in 1963 set a new high for the ninth consecutive year. Revenue from sales, services and equipment rentals totaled $592,580,000 for the year ended December 31, compared with $564,021,000 in 1962, or an increase of 5%.

Reported net income for 1963 after taxes was $20,082,000 compared with $20,645,000 in 1962, or a decrease of 3%. On a per-share basis, earnings were $2.42 on each of the 8,299,607 shares outstanding at year's end, compared with $2.49 on 8,298,707 shares in 1962.

Research and development expenditures reached a new high of $20,027,000 in 1963. Earnings were affected by the fact that during 1963 the company increased the total of its computer systems installed to over 700 which was double the number of such installations in 1962.

During 1963, $30,716,000 in new systems and machines were added to NCR's pool of rented equipment.

The Radio Corporation of America (NYSE) established new all-time records in 1963 with sales $1,789,277,000 and an after-tax profit of $66,033,000. Earnings per common share were $3.61 compared with $2.84. Profits were 28 percent higher than the previous peak reached in 1962, on an increase of slightly more than two percent in sales. The fourth quarter of 1963 was the best single profit quarter in RCA history.

To date, RCA has invested over $130 million to develop, introduce and promote its electronic computers. RCA President Elmer Engstrom said he expects to cross for the first time into a profit position in the last quarter of 1964.

RCA announced a quarterly dividend of 15 cents per share on the Common Stock payable April 27, 1964. This is the first quarterly dividend on the Common Stock since it was split three-for-one, effective January 31, and is equivalent to the 45 cents per share paid on the old Common Stock on January 27, 1964. Prior to the January payment the Corporation made three consecutive quarterly payments of 35 cents per share on the Common Stock.

BUSINESS AND FINANCIAL NEWS

The Standard Register Company (OTC) showed profits for 1963 below those of 1962. Unaudited figures for 1963 closed the year with a volume of $65,099,574, and earnings at $3,016,328 equivalent to $1.41 per share. In 1962, $65,317,352, and earnings $3,785,133 or $1.77 a share. Fourth quarter 1963 figures indicated volume at $17,297,555 as opposed to $17,166,858 in 1962, and earnings of $762,394 or $.36 per share as opposed to $1,077,114 or $.50 per share in 1962.

Among the factors cited as responsible for the profit decline were a substantial reduction in Federal Government business; "break-in" costs for the new Bedford, Pa., plant; increased labor, material and depreciation costs; and an unsuccessful, now abandoned marketing program on DataRay, a card reading and data transmitting device. Standard Register has filed a suit against the Raytheon Co., the manufacturer of DataRay in an effort to recover $312,374 it paid to buy and market the DataRay equipment. Standard Register maintains that Raytheon engineers concealed the fact that they believed the equipment was not reliable and in need of redesign.

On February 12, the Board of Directors declared a quarterly dividend of twenty cents per share, payable March 6, 1963.

Thompson Ramo Wooldridge Inc., (NYSE) has announced sales of $482.6 million for 1963, an increase of $22.3 million over the $460.3 million reported for 1962.

Net income for 1963 was $15.2 million, equal to $3.95 per share on the 3,763,990 shares of common stock outstanding at the yearend, compared with $12.5 million or $3.25 per share on the 3,758,992 shares outstanding at the end of 1962.

TRW recently sold its TRW Computer Division at Canoga Park, Calif.; its Numerical Control Systems group at Cleveland, Ohio; and its international computer operations in France, England and Japan to the new Bunker-Ramo Corporation for an undisclosed amount of cash and 10% ownership of B-R. TRW retains an option to double its holdings in B-R. Martin Marietta Corporation currently owns the remaining 90% of the new corporation.

The results of this transaction are not reflected in the 1963 financial figures of TRW. Unofficial estimates of the amount of cash received by TRW in setting up the B-R Corp. range between $17 and $20 million.

In a further move away from products with high R & D costs such as computers, TRW last week announced that it is closing down its semiconductor operations in Lawndale, Calif. These activities will be transferred to another TRW unit, Space Technology Laboratories. Currently, about 50 people are working at the Lawndale facility.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF MARCH 20, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVG MONTHLY RENTAL	DATE OF FIRST INSTS.	NUMBER OF INSTS.	# OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7,500	2/61	18	7
Advanced Scientific Instruments	ASI 210	Y	$2,850	4/62	15	2
	ASI 2100	Y	$3,000	12/63	2	3
Autonetics	RECOMP II	Y	$2,495	11/58	78	X
	RECOMP III	Y	$1,495	6/61	21	X
Bunker-Ramo Corp.	TRW-230	Y	$2,680	8/63	10	X
	RW-300	Y	$6,000	3/59	35	X
	TRW-330	Y	$5,000	12/60	27	6
	TRW-340	Y	$6,000	12/63	3	6
	TRW-530	Y	$6,000	8/61	20	X
Burroughs	205	N	$4,600	1/54	68	X
	220	N	$14,000	10/58	46	X
	E101-103	N	$875	1/56	135	X
	E2100	Y	$535	8/64	0	160
	B250	Y	$4,200	11/61	41	12
	B260	Y	$3,750	11/62	68	60
	B270	Y	$7,000	7/62	60	45
	B280	Y	$6,500	7/62	83	58
	B5000	Y	$16,200	3/63	25	15
Clary	DE-60/DE-60M	Y	$525	2/60	160	3
Computer Control Co.	DDP-19	Y	$2,800	6/61	3	X
	DDP-24	Y	$3,080	5/63	11	28
	SPEC	Y	$800	5/60	10	X
Control Data Corporation	G-15	N	$1,000	7/55	306	X
	G-20	Y	$15,500	4/61	27	X
	160/160A	Y	$1750/3000	5/60&7/61	345	22
	924/924A	Y	$11,000	8/61	23	8
	1604/1604A	Y	$35,000	1/60	56	15
	3600	Y	52,000	6/63	12	18
	3400	Y	$32,000	11/64	0	10
	3200	Y	$9,000	5/64	0	30
	6600	Y	$150,000	3/64	1	2
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	54	7
	PDP-4	Y	Sold only about $60,000	8/62	32	12
	PDP-5	Y	Sold only about $25,000	9/63	12	26
	PDP-6	Y	Sold only about $300,000	7/64	0	1
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	25	X
Friden	6010	Y	Sold only about $22,000	6/63	77	88
General Electric	210	Y	$16,000	7/59	72	4
	215	Y	$5,500	11/63	14	15
	225	Y	$7,000	1/61	160	30
	235	Y	$10,900	12/63	5	10
	425	Y	$6,500	7/64	0	22
	435	Y	$12,000	10/64	0	8
	455	Y	$18,000	6/65	0	2
	465	Y	$24,000	6/65	0	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVG MONTHLY RENTAL	DATE OF FIRST INSTS.	NUMBER OF INSTS.	# OF UNFILLED ORDERS
General Precision	LGP-21	Y	$725	12/62	90	45
	LGP-30	semi	$1,300	9/56	440	3
	RPC-100	Y	$1,875	1/61	98	3
Honeywell Electronic Data Processing	H-200	Y	$4,200	3/64	0	375
	H-100	Y	$5,000	12/61	92	34
	H-800	Y	$22,000	12/60	60	5
	H-1400	Y	$14,000	1/64	4	12
	H-1800	Y	$30,000	1/64	3	6
	DATAmatic 1000	N	--	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3,600	12/57	580	X
	650-card	N	$4,000	11/54	435	X
	650-RAMAC	N	$9,000	11/54	90	X
	1401	Y	$3,500	9/60	6550	750
	1401-G	Y	$1,900	5/64	0	750
	1410	Y	$12,000	11/61	285	205
	1440	Y	$1,800	4/63	630	2650
	1460	Y	$9,800	10/63	150	350
	1620	Y	$2,000	9/60	1450	60
	701	N	$5,000	4/53	1	X
	7010	Y	$19,175	10/63	8	24
	702	N	$6,900	2/55	2	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	48	X
	7040	Y	$14,000	6/63	30	55
	7044	Y	$26,000	6/63	18	17
	705	N	$30,000	11/55	100	X
	7070, 2, 4	Y	$24,000	3/60	450	100
	7080	Y	$55,000	8/61	63	19
	709	N	$40,000	8/58	12	X
	7090	Y	$64,000	11/59	72	5
	7094	Y	$70,000	9/62	235	70
	7094 II	Y	$76,000	4/64	0	145
ITT	7300 ADX	Y	$25,000	7/62	8	2
Monroe Calculating Machine	Monrobot IX	N	Sold only $5800	3/58	169	X
	Monrobot XI	Y	$700	12/60	355	185
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	0
	NCR - 310	Y	$2,000	5/61	45	4
	NCR - 315	Y	$8,500	5/62	155	102
	NCR - 390	Y	$1,850	5/61	535	205
Packard Bell	PB 250	Y	$1,200	12/60	150	10
	PB 440	Y	$3,500	3/64	1	9
Philco	1000	Y	$7,010	6/63	14	10
	2000-212	Y	$52,000	1/63	6	6
	2000-210, 211	Y	$40,000	10/58	19	6
Radio Corp. of America	Bizmac	N		-/56	4	X
	RCA 301	Y	$6,000	2/61	396	150
	RCA 3301	Y	$20,000	7/64	0	9
	RCA 501	Y	$15,000	6/59	94	5
	RCA 601	Y	$35,000	11.62	3	2
Scientific Data Systems Inc.	SDS-910	Y	$2,000	8/62	44	42
	SDS-920	Y	$2,700	9/62	31	15
	SDS-930	Y	$4,000	4/64	0	6
	SDS-9300	Y	$7,000	4/64	0	2
UNIVAC	I & II	N	$25,000	3/51&11/57	36	X
	Solid-State II	Y	$8,500	9/62	38	7
	III	Y	$20,000	8/62	53	82
	File Computers	N	$15,000	8/56	45	X
	Solid-State 80, 90, & Step	Y	$8,000	8/58	360	5
	418	Y	$11,000	6/63	3	5
	490	Y	$26,000	12/61	27	21
	1004	Y	$1,500	2/63	990	1430
	1050	Y	$7,200	9/63	22	176
	1100 Series (except 1107)	N	$35,000	12/50	18	X
	1107	Y	$45,000	10/62	16	13
	LARC	Y	$135,000	5/60	2	X
				TOTALS	17,836	8931

X = no longer in production. To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the 7044, 7074, and 7094I and II are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

March 2-13, 1964

	1963-64 High	1963-64 Low	2 Weeks Sales	2 Weeks High	2 Weeks Low	Last	2 Weeks Net Change	2 Weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	68	43 3/8	881	49 1/2	45 7/8	48 1/2	+5/8	+1.28%
American R & D	33 3/8	16 1/4	118	24 7/8	22 1/4	23 3/8	+1/8	+0.51%
Burroughs	34	22 1/8	761	25 3/8	23 3/4	23 7/8	+1/4	+1.06%
Control Data	113 3/8	36 1/2	2888	90 7/8	75 7/8	80 1/8	-7 3/8	-8.42%
Electronic Associates	80 7/8	31 1/4	382	56 1/2	50 1/8	54 7/8	+3 7/8	+7.58%
General Dynamics	31 5/8	23 1/8	3283	31 5/8	28 1/4	30 3/4	+3/4	+2.90%
General Electric	90 7/8	71 3/4	2540	90 5/8	85 7/8	89 5/8	+4 5/8	+5.43%
General Precision	43 5/8	27 1/2	455	29 3/4	28 3/8	29 1/2	-1/8	-0.40%
IBM	592	384 1/4	775	592	556	588 1/2	+19 1/2	+3.43%
Inter. Tel & Tel.	57 3/4	41 3/4	993	55 5/8	52 3/4	55 1/4	+2 1/2	+4.73%
Litton Industries	86 3/4	57 1/2	1387	69	65 7/8	67 1/2	-7/8	-1.29%
Minneapolis-Honeywell	150 1/4	84 1/2	701	134	122 1/4	129 1/4	-4 1/2	-3.34%
Nat. Cash Register	85 3/8	65	628	78	73 1/2	77 1/2	+3 7/8	+5.20%
Packard Bell	18 1/2	9 1/4	139	13 1/4	12	12 3/8	+1/8	+1.03%
RCA	39 1/4	33 1/4	12,272	39 1/4	34 1/2	37 3/8	+3 3/8	+9.91%
Sperry Rand	22 3/8	12 7/8	4801	18 7/8	17	18 1/2	+7/8	+4.93%
Xerox	96 3/8	70	6385	88 7/8	78 1/4	86 7/8	+7 5/8	+9.64%
NYSE COMPUTER STOCK AVERAGE				87.59	80.74	85.51	+2.07	+2.48%
AMERICAN STOCK EXCHANGE								
Anelex	44	27 1/2	315	30 1/8	27 1/2	28 5/8	-1 3/8	-4.56%
Clary	9 1/8	4 1/2	280	7 1/2	6 1/8	6 7/8	+3/8	+5.69%
Computer Sciences	29 5/8	21 1/4	130	24	21 5/8	22 1/8	-7/8	-3.78%
Potter Instrument	14 3/4	6 7/8	168	11 1/8	8 7/8	9 3/4	+3/4	+8.33%
Teleregister Corp.	10 1/4	4 3/8	681	9 3/8	8	8 7/8	+1/8	+1.37%
AMEX COMPUTER STOCK AVERAGE				16.43	15.83	15.25	-0.20	-1.31%

OVER-THE-COUNTER	1963-64 High	1963-64 Low	2 Weeks Bid	2 Weeks Asked	Prev. Bid
CEIR	15	9 3/4	10	11 1/4	10 1/2
Computer Control	17 3/8	12 3/4	15 7/8	17 3/8	16 5/8
Data Products	8 1/8	4 3/4	4 1/8	5 5/8	5 1/4
Digitronics	20	12 1/4	14	16 1/2	15
Dura Corp.	38	31 3/4	35 7/8	38 5/8	37 1/2

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

SPECIAL FEATURE THIS ISSUE:
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The Computer Control Company, Inc. .....Page 3

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ORDERING ACTIVITY IS BRISK FOR SEVERAL MANUFACTURERS FOLLOWING THE ANNOUNCEMENT OF IBM'S NEW SYSTEM/360 EDP SERIES

As predicted in our last issue, IBM introduced their new computer system on Tuesday, April 7th, claiming the date as the birthday of a new concept in computers. Chairman Thomas Watson referred to the new IBM System/360 as "the most important new product announcement in the company's history".

Main features of the new IBM computer line include (1) the use of hybrid circuitry in the six central processor models (30,40,50,60,62 and 70) of the System/360 to yield logic circuit speeds as fast as six billionths-of-a-second; (2) a broad range of memory sizes from 8K to 512K characters allowing 19 combinations of speed and memory in the central processors; (3) up to 8 million characters of bulk core storage (for $52,000 per month) with an 8 usec. access time; (4) twenty-six new peripheral units bringing to 44 the number of peripherals which can be hooked-up to the System/360; and (5) a common basic instruction set for all processor models, allowing the user to run a System/360 program on any processor with equivalent peripherals and memory, as long as the program is not time dependent.

Typical system rentals for the System/360 run from $3500 per month for the Model 30 with 16K characters of storage to $70,000 per month for the Model 70 with 512K characters of storage.

With admirable efficiency, IBM's huge computer marketing force presented the details of the new system to over 200 reporters from across the country at a press conference in Poughkeepsie, to over 90,000 customers and prospects in 165 U.S. cities, and to over 50,000 foreign customers and prospects in 90 cities, all in the same day. The remainder of the week saw the presentation of an integrated series of newspaper ads, slide and movie presentations, and four color brochures supported and distributed by over 4500 IBM computer sales personnel to thousands of prospects for the System/360. The order books were open, and major prospects were advised they could obtain early delivery dates for models of the new system if they acted promptly in placing their order in the delivery queue. As the computer center manager at a large aerospace firm told us on Friday, April 10th, "a special team of IBM personnel have been here since Wednesday morning supplying information and making presentations to our personnel, and with their promise of late summer or fall, 1965, delivery date, we will be getting into line shortly for a model 50 or 60." The IBM announcement ended months

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of speculation on the part of the EDP industry and hesitation on the part of EDP system buyers as to what IBM would offer as its new computer line. To determine the reaction, we made a telephone survey of a group of major EDP users in the three days following the announcement. The results indicated that ordering activity was brisk not only for the System/360, but also for machines of other manufacturers...orders held off until IBM made the Systems/360's capabilities and delivery schedule known.

The System/360 is apparently being warmly received by current 7000 series users. The higher end of the System/360 offers compiling capacities from 15 to 20 times that of the largest computers in the 7000 series, and 6 to 10 times the throughput for equivalent system costs. The model 50 processor system is being rather heavily ordered by the 500 or so existing users of the IBM 7044 and 7070,2,4 computer systems. Several 7090,4 users mentioned that they are ordering the model 50 to be linked up with a model 70 in a multi-computer system.

Among 1400 series users, the System/360 is being received with considerably more hesitation. The model 30 processor offers about four times the throughput of the 1401 for equivalent system costs when programs are written specifically for each system. IBM is offering a 1401 "emulator" on the models 30 and 40 which allows those processors to accept 1401 programs and interpret them in System/360 processing steps through the use of a special read-only storage. However, processing efficiency in the models 30 and 40 is cut in half when handling 1401 instructions in this manner.

The rapid appearance of computers with 1401 program translators and 1401 simulators such as the H-200, GE-415 and B200 series is causing many 1400 series users to consider carefully the advantages of converting currently to a competitive system rather than waiting eighteen to twenty months for a System/360 which might be behind the state-of-the-art when ready for delivery. This feeling is likely to be intensified in the near future when UNIVAC and RCA also enter the 1401 replacement market with special equipment and programming aids before the end of this summer.

Among the machines being ordered in quantity by users surveyed following the IBM announcement are the UNIVAC 1050, the H-200, the Control Data 3200 and the GE-415.

One of the most attractive features of the System/360 to users may prove to be a major competitive handicap to IBM, e.g., the basic instruction set that operates on all System/360 processors. This offers other hardware manufacturers the opportunity to develop a series of computers designed to utilize the same or a similar set of instruction codes and thereby benefit from the massive programming library which IBM is developing for the System/360. Without having to bear the sizable expense of developing a comprehensive software package for its computers, a manufacturer offering a computer with the same instruction set as the System/360 might well find that he could price his machine considerably under equivalent models of the System/360.

From the present rate of orders and soon-to-be orders for the System/360, it is likely that IBM will have found customers for the first 1000 System/360 units by the end of this month.

KEEPING AHEAD OF THE MARKET

• IBM judiciously chose to start the numbering on the processors of the System/360 at 30 and end at 70 to allow both upward and downward expansion.

Upward expansion is already underway as IBM is currently negotiating for orders to build two prototype model 90 systems which it believes will be the most powerful computers in the world. One system is being proposed to the Lawrence Radiation Laboratory to add to their collection of "fastest" computers (currently including the LARC, STRETCH, and CDC 6600). A special statement given to us by IBM on the model 90 states that "we (IBM) are still feeling our way, and still have to resolve some cost and manufacturing problems. If it develops that systems of this magnitude can be successfully produced on an assembly line basis, we see a substantial market. The cost of the ultra-large system will be dependent on the specific configuration. This more powerful version of System/360 was not announced April 7, because we announced System/360 configurations which are in our standard sales catalog."

• Honeywell is planning to announce at the SJCC what it now calls the H-200S, a scientific version of the highly successful H-200. The word length is 24-bits, and the processing speeds will be in the vicinity of 2 usec. for a fixed point addition and 8 usec. for a floating point multiply. System rental costs for the new computer is expected to be about $4,000 per month.

H200S

PROFILE OF A COMPUTER MANUFACTURER: Computer Control Company, Inc.

EDITOR'S INTRODUCTION: William Norris, President of Control Data Corp., remarked last fall that he estimates that by 1970 only six of the twelve major firms now making computers will be still in that business. As captain of one of the two major firms currently making a profit in the $2 billion computer market, Mr. Norris's words cannot be ignored. Certainly, the rapid changes in the design of computer systems, and in the nature and scope of electronic data processing activities suggest that there will be considerable restructuring in the character and market position of both the major and the minor firms currently bidding for the dollar of the EDP system buyer.

In an effort to put the character and capabilities of the current computer manufacturers in prospective, and to provide some hint of their future, we will be examining in detail the technical and market position of each of these firms in forthcoming issues. In this issue, we look at Computer Control Company of Framingham, Mass.

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With total sales volume of just over $11 million in fiscal 1963, Computer Control Company is not now numbered among the major manufacturers in the EDP industry. However, in terms of growth, it is a leader. Last year sales of its DDP-19 and DDP-24 computers accounted for about 9% of total sales, or about $1 million. This year computer sales are expected to represent about 35% of total sales of about $16 million, or approximately $5.5 million. This impressive growth in computer sales and in total com-

pany business has been accompanied by a continuing increase in earnings in the past several years. This has made 3C an attractive opportunity for the investor, as indicated by the doubling in the price of its stock (traded over-the-counter) in the last eight months.

Since its founding in 1953, 3C has engaged in the design, manufacture and marketing of a range of products connected with the electronic handling of information in digital form. These products are made at 3C's manufacturing and engineering facilities in Framingham, Mass., and in Los Angeles, Calif., and in a wholly owned manufacturing facility in Peterborough, New Hampshire. Currently, its major product lines are digital modules and memories, special purpose systems, and general purpose computers.

Digital Modules and Memories: 3C offers a line of digital logic modules, known as 3C-PACs, which are produced for inventory and sold from catalog specifications. It also produces two types of digital memory elements, one using magnetic cores and the other a wire delay line to store information. Also, a line of instruments for testing these logic modules and memories, and those from other makers, is produced.

3C sells these products to other equipment manufacturers and to government laboratories, as well as using them in the assembly of its own computers. Since 3C was among the first firms to offer a broad line of standard, high quality digital modules at prices reflecting mass production savings, modules have been the major contribution to sales volume in the past. This product group accounted for 65% of direct customer sales in 1963 (the major share being modules). It is expected to account for about 40% in fiscal 1964.

Special Purpose Systems: 3C has applied digital computer technology to the design and construction of a number of special purpose systems which were developed to fulfill requirements that could not be fulfilled effectively or economically by commercially available general purpose computers. Examples of these include data converters, space data systems, training computers, navigational and positioning systems, signal processing equipment, machine and instrument control equipment, and information storage and retrieval systems. Sales of these systems accounted for approximately 26% of sales in fiscal 1963, and are expected to account for about 25% in fiscal 1964.

General Purpose Computers: Having developed the logic modules which are the "guts" of a computer, and having built several special purpose computers successfully, 3C decided in 1959 to develop and make a medium-scale, general purpose computer, and offer it for sale. The result was the DDP-19 (Digital Data Processor). From late 1961 to early 1963 the company was able to sell just three units. This weak showing was due in part to the computer's odd nineteen-bit word length and to the lack of an effective programming package.

In March 1963 a redesigned computer was introduced, with the word length expanded to twenty-four bits, the programming package improved, and a new name, the DDP-24. This redesigned computer has been warmly received by several firms who are themselves building special purpose data handling systems for military and aerospace projects. The DDP-24 has been able to pick up 40 orders in the 12 months since its introduction.

Currently, 11 DDP-24's have been installed with an average selling price of $120,000 (including peripherals). Buyers include Melpar, Inc. which is using 6 DDP-24's in helicopter trainers for the Navy, Aircraft Armaments, Inc. which is using a couple of 24's in a radar digitizing system for the FAA, Rucker Co. which is using a couple of 24's in the control system of the centrifuge training unit for the astronauts in the APOLLO Project, and McDonnell Aircraft Corp. which is putting a 24 in a Gemini Flight Training System. Also, the leading analog computer manufacturer, Electronic Associates, Inc., has placed an immediate order for three 24's as part of a continuing order for the 3C computer to be used as the digital portion of EAI's new HYDAC-2400 analog/digital computer system. Industry estimates are that EAI expects to sell between 20 and 25 HYDAC-2400's in the next eighteen months.

At the current time backlog on the DDP-24 is about $3,800,000, which includes the expected income in computers on lease or being produced for lease. We estimate that about 14 of the 40 orders for the DDP-24 are on a leasing basis. This is a much lower percentage (35% versus about 80%) of computers on lease than found for such major computer manufacturers as IBM, Honeywell, RCA, GE, etc. The need for a faster return on capital investment restricts 3C's ability to offer computer leasing arrangements more extensively. The current delivery time on the 24 is four to six months.

3C has just unveiled its newest computer, the DDP-224. This machine is considerably faster than the DDP-24 (260,000 additions per second vs. 100,000; 6.4 usec. multiply time vs. 31 usec.; 1.9 usec. memory cycle time vs. 5 usec.). The new computer features special options which make it possible to combine several 224's into a multi-computer system with common memory, control and arithmetic. The 224 with 4096 words of core memory sells for $96,000, or just slightly more than the $87,000 basic price for the 24, although the 224 has from three to four times the throughput capacity of the 24. To reflect this difference, 3C is believed to be planning to lower the price on the 24 shortly.

DDP-224

On the basis of announced specifications, we would expect that 3C could find orders for about 35 DDP-224's before the end of this year. Total sales on the DDP-24 can be expected to be somewhat curtailed by the newer and faster machine, with a total of 40 installed and several on order by the end of 1964. The recent cutback by the DOD in several military space programs can be expected to limit the potential market for the 224 this year.

Competition

President Ben Kessel of 3C likes to compare his company's relationship to the giants of the EDP industry by noting that most of the major system builders are designing their systems toward the goal of communicating easily with man through such peripheral devices as optical scanners, data communication terminals, etc. 3C is building computers, Kessel states, to communicate directly with other machines. He likes to call his computers "macromodules", indicating that they are simply an expansion of 3C's basic logic module line into a giant unit with programmable logic capabilities.

Interestingly, the two firms which offer computers which are directly competitive with 3C's DDP-24 and 224 in this market also offer digital

logic modules as a major product line, and build their computers from their own lines of modules. These firms are Digital Equipment Corp. of Maynard, Mass., and Scientific Data Systems, of Santa Monica, Calif. DEC's PDP-1 has virtually the same computing power speeds of the DDP-24 although the price is about 20% higher. The PDP-1 includes among its peripherals some sophisticated visual display equipment, and this has been a major factor in achieving for the PDP-1 60 or so orders for scientific and engineering applications since its introduction in 1960.

SDS's 920 has been the most direct competitor of the DDP-24, offering about the same multiply time and a 60% slower add time as the DDP-24, with the addition of a special microprogramming register, for a slightly lower cost. The 920 has been able to pick up about 46 orders since its introduction early in 1962. 3C's new DDP-224 would seem to considerably outperform the 920 for the slightly increased cost.

Advanced Scientific Instruments, Minneapolis, Minn., a division of Electro-Mechanical Research, Inc., introduced in 1963 the ASI 2100 computer with computing speeds roughly equivalent to the new DDP-224, although the 2100 uses an odd 21-bit word length. To date, two 2100's have been installed and three are currently on order. It is not believed that ASI has the resources at the current time to go into expanded production on this machine.

Immediate Prospects

The short term prospects for 3C appear very bright. With a strong management and technical team active within the company, a competitive group of products in the expanding digital logic and computer market, 3C should enjoy a 50% growth in sales in fiscal, reaching the $16 million net sales figure already mentioned.

Among the new products expected from 3C in the coming year are various small general purpose computers with a design and programming specially created to appeal to a specific application area where a market exists for some 10 to 100 machines. Examples of these market areas are numerically controlled machine tools, pipeline flow monitoring, automatic typesetting equipment, and data communications control.

The profit margin for 3C has been fairly low in the past. 3C's after tax profit margin in 1963 reached 4%, the highest it has been since the 5% in 1959. Part of the reason for this has been high R&D expenses. In 1963 R&D expenses registered 8.8% of net sales. In fiscal 1961 and 1962 the same figure was 9.5% and 10.3% respectively. In 1964 R&D expenses are expected to rise to 11% of sales, as the company begins to prepare to deal with the new technology of microelectronics (see below). Consolidated income statements for 3C for the five years ended November 2, 1963 are:

	Fiscal Year Ended				
	Oct. 31, 1959	Oct. 29, 1960	Oct. 28, 1961	Nov. 3, 1962	Nov. 2, 1963
Net Sales	$2,869,713	$3,084,229	$4,811,921	$8,669,333	$11,081,415
Cost of Sales, Exclusive of Research and Development	1,794,390	2,022,205	3,275,933	5,154,853	6,633,451
Research and Development	190,294	344,065	430,877	893,778	974,267
Total Cost of Sales	1,984,684	2,366,270	3,706,810	6,048,631	7,607,718
Gross Profit	885,029	717,959	1,105,111	2,620,702	3,473,697
Selling, Administrative and General Expenses, Exclusive of Interest Expense	593,670	705,604	987,738	1,936,379	2,395,842
Interest Expense	9,348	24,863	36,411	75,893	90,735
Total Selling, Administrative and General Expenses	603,018	730,467	1,024,149	2,012,272	2,486,577
Income from Operations	282,011	(12,508)	80,962	608,430	987,120

Other Income		1,206	5,974	16,464	12,020
Other Deductions, including profit sharing	(1,013)	(5,563)	(7,587)	(58,006)	(111,467)
Income (Loss) before Provision for Federal Income Tax	280,998	(16,865)	79,349	566,888	887,673
Provision for Federal Income Tax	135,774	2,062	36,469	276,895	451,597
Net Income (Loss)	$ 145,224	$ (18,927)	$ 42,880	$ 289,993	$ 436,076
Shares of Capital Stock Outstanding at End of Period	779,400	903,711	894,711	879,886	1,011,326
Net Income (Loss) per Share of Capital Stock	18.6¢	(2.1)¢	4.8¢	33.0¢	43.1¢

3C made its first public offering of stock in February, 1963 with the sale of 200,000 shares. Offering price was $8.00 per share. In February, 1964, 3C sold an additional 175,000 shares and officers of 3C sold 71,000 shares as principal stockholders. The offering price was $15.75. The net proceeds of approximately $2,523,950 from the recent offering was used to reduce short term bank loans. Following the recent offering, 3C had 1,188,806 shares outstanding.

On the basis of the above information, we expect that 3C will achieve net income of about $600,000 in fiscal 1964, with an income per share of around 50¢.

Future Prospects

The question mark in the future of 3C forms around its ability to adjust to the new microelectronic circuit technologies. Hybrid and integrated circuitry incorporates many basic circuit elements within a single crystal, thin film or other substrate. The advantages of these microcircuits are low power requirements, high reliability, and low cost.

This new circuit technology tends to merge the role of the electronic component manufacturer and the logic module manufacturer since complex circuits are the result of the basic production activity in microelectronics.

The cost of getting into the microelectronic field as a manufacturer is enormous. IBM is believed to have spent over $70 million in development costs on the design and production of the hybrid circuitry in its recently announced System/360. Industry experts estimate it would cost 3C over $8 million just to set up production facilities for hybrid or integrated circuits. Certainly, this would be too high a threshold cost for 3C to weather in the next several years, so it is unlikely that 3C will be able to move into the microelectronics area as a circuit manufacturer.

President Kessel noted to us that 3C is alert to this situation, and has already set up a special laboratory to study the technology of this new circuitry, so that it will be able to purchase these units wisely from vendors. Kessel feels confident that there will be a continuing place for his company as a macromodule maker which takes the basic microelectronic circuitry and assembles it into well-engineered, well-packaged subsystems. 3C already has a Navy contract at its West Coast facility for the design of a digital resolver using integrated circuits.

The main impact of hybrid and integrated circuitry on the design and production of computers and special purpose systems should not be felt until the beginning of 1966 when the first computers competitive with 3C's current product line are offered with microelectronic circuits. The position of 3C in this new technology should be a critical indicator of the future development of the company.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

March 20 - April 3, 1964

	1964 High	1964 Low	3 weeks Sales In 100s	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	45 7/8	1148	51 3/8	47	48	-1/2	-1.03 %
American R & D	27	21 3/4	225	24 3/4	22 3/4	23 1/2	+1/8	+0.54
Burroughs	25 3/8	22 1/4	1045	24 7/8	22 5/8	23 5/8	-1/4	-1.05
Control Data	106 3/8	74 1/4	2677	81 3/4	74 1/4	78 1/4	-1 7/8	-2.34
Electronic Associates	60 5/8	45 1/4	421	59 3/4	53 1/2	53 1/2	-1 3/8	-2.51
General Dynamics	31 5/8	23 1/2	2059	31 1/4	28 5/8	28 5/8	-2 1/8	-6.91
General Electric	90 5/8	84 1/2	2182	90 1/2	84 3/4	88 5/8	-1	-1.12
General Precision	32 3/8	25 3/4	1644	29 7/8	25 3/4	27 7/8	-1 5/8	-5.51
IBM	600	507 1/2	1093	600	572	598 1/2	+10	+1.70
Inter. Tel. & Tel.	57 3/4	52 5/8	1495	57 1/2	55 1/8	57 1/8	+1 7/8	+3.39
Litton Industries	79 5/8	64	1461	71 1/2	65 3/8	70	+2 1/2	+3.70
Minneapolis-Honeywell	148 3/4	115 1/4	984	130	115 1/4	122 1/4	-7	-5.42
Nat. Cash Register	79 3/4	70 1/4	783	77 5/8	71 3/4	73 1/4	-4 1/4	-5.48
Packard Bell	15 1/2	10 5/8	240	12 5/8	10 5/8	11 1/8	-1 1/4	-10.10
RCA	39 1/4	33 1/4	9121	37 3/4	35 1/8	35 3/8	-2	-5.35
Sperry Rand	21 3/4	17	6175	19 1/8	17 5/8	17 7/8	-5/8	-3.38
Xerox	96 3/8	70	4675	90 3/4	84 1/2	85 1/2	-1 3/8	-1.58
NYSE COMPUTER STOCK AVERAGE				87.70	81.57	84.88	-.63	-2.64
AMERICAN STOCK EXCHANGE								
Anelex	44	27 1/2	328	32 7/8	29	30 1/2	+1 7/8	+6.55 %
Clary	7 1/2	5 3/4	164	6 7/8	6 1/4	6 3/8	-1/2	-7.27
Computer Sciences	29 5/8	21 1/4	760	27 7/8	21 5/8	24 1/8	+2	+9.04
Potter Instrument	12 1/4	7 3/4	95	10 3/8	9 1/8	9 3/4	0	-----
Teleregister Corp.	11 1/2	7 5/8	2941	11 1/2	8 7/8	11 3/8	+2 1/2	+28.17
AMEX COMPUTER STOCK AVERAGE				17.90	14.98	16.43	+1.18	+7.30

	1964 High	1964 Low	3 weeks Bid	3 weeks Asked	Prev. Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	10 1/2	14	10 1/2
Computer Control	17 3/8	12 3/4	14 3/4	17 5/8	15 7/8
Data Products	8 1/8	3 5/8	3 3/4	5	4 1/8
Digitronics	20	12 1/4	12 1/2	16 1/2	12 1/2
Dura Corp.	38	31 3/4	35 1/2	39 3/4	37 1/2

SIGNIFICANT NEW COMPUTER ORDERS

Company	Address	Computer On Order	Expected Installation Date
Aluminum Company of America	Pittsburgh, Penn.	UNIVAC 490, IBM 1401	1965
Chemstrand Co.	Greenville, S.C.	IBM 1410	November, 1964
CIT Financial Corp.	New York, N.Y.	IBM 1410	1965
General Electric Co.	Salem, Va.	GE 425	1965
GENESCO	Nashville, Tenn.	IBM 7010	November, 1964
Hutton, E.F., & Company, Inc.	New York, N.Y.	RCA 301	November, 1964
Industrial National Bank of R.I.	North Scituate, R.I.	GE 425	November, 1964
Insurance Company of North America	Philadelphia, Penn.	IBM 7080	May, 1965
Insurance Data Processing Center	New York, N.Y.	2-IBM 1460	February, August, 1965
Merrill Lynch, Pierce, Fenner & Smith	New York, N.Y.	IBM S/360 (50)	Fall, 1965
Philadelphia National Bank, The	Philadelphia, Penn.	GE 235	March, 1965
Philadelphia Naval Shipyard	Philadelphia, Penn.	UNIVAC III	January, 1965
Socony Mobil Oil Co.	New York, N.Y.	IBM S/360 (50 & 70)	Fall, 1965
Southern Illinois University	Carbondale, Ill.	IBM 7040	December, 1964
Southern Railway Co.	Atlanta, Ga.	IBM 7740	1965
Sylvania Electric Products, Inc.	Camillus, N.Y.	IBM 7074	January, 1965
Thiokol Chemical Corp.	Brigham City, Utah	IBM 1460	4th quarter, 1964
United Medical Service, Inc.	New York, N.Y.	IBM 1410, H 800	1965
University of Missouri	Columbia, Mo.	IBM 7040	1965
Wilmington Trust Company	Wilmington, Del.	IBM 1460	1965

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM EARNINGS UP 46% IN FIRST QUARTER...SYSTEM/360 ORDERS NEAR 1000; COMPANY PONDERS INTRODUCTION OF MODEL 20 PROCESSOR, 7000 SERIES PROGRAM CONVERSION

At the Annual Meeting this past Tuesday, IBM Chairman Thomas J. Watson Jr. noted that orders for the new System/360 were coming in at "a slightly better pace" than the company's market forecasters had anticipated. As mentioned in our March 23th issue, we understand that IBM expects to install approximately 5000 System/360 EDP systems by the fall of 1968, with the first installations beginning in July, 1965. Our research into System/360 sales indicates that IBM has about 950 orders currently...including about 80 orders for the model 70 processor which normally calls for several model 30 or 40's as satellite computers.

Favorable ordering or no, IBM still faces several major problems with the System/360. One is how long they can delay the announcement of their model 20 processor system, which will extend the System/360 into the 1401-G and 1440 market...either as a replacement for an existing punched card installation or a freshly installed 1401-G or 1440...as well as a UNIVAC 1004. The model 20 can be expected to have a typical system rental of $2600. per month, with a 4 usec. memory cycle time and from 8K to 64K characters of memory. The cost of the central processor for the model 20 will be only about $750. per month, so IBM will have considerable pricing flexibility in the system by developing low cost peripherals tailored for specific markets.

The problem with the model 20 is that IBM enjoys a considerable backlog on the 1401-G and the 1440. The 1440 installations began in quantity just last fall, and 1401-G installations begin next month. The total of some 2650 orders IBM holds on these machines cannot be expected to stay if customers found they could obtain a better performing, more flexible model 20 system within six to nine months of the anticipated delivery date of their current 1401-G or 1440 order. Because of these anticipated order losses for machines already in production or about to be installed, we feel that IBM will delay the model 20 announcement until late summer or early fall of this year, and schedule first deliveries on the model 20 for early 1966.

Upward expansion of the System/360 into the super-scale model 90 was described in our last issue (see Control Data comment this issue).

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Another problem which faces IBM on the System/360 is the expected appearance on the market of competitive computers which offer automatic program translators for users of several models of its 7000 series computers. The System/360 is not program compatible with members of the 7000 series, and IBM could normally be expected to receive extended rental payments from 7000 series users who keep putting off the costly period then they will have to reprogram for System/360. Since programming is judged to represent between a third to a half of the total cost of an EDP installation, this reprogramming expense can be an unwanted budget-buster. Therefore improved computers from IBM's competitors which offer the 7000 series user virtually automatic program conversion to a more economic EDP system could lead to considerable customer fall-out among existing 7000 series users. Still glowing from the success of the H-200, Honeywell is belived to be preparing a 1410/7010 program translator for its upcoming H-1200 computer, which will extend the concept of the H-200 into the $12,000 per month range. Also, Honeywell can be expected to extend their newly announced H-300 scientific computer into a $12,000 per month 36 bit machine, and offer program translators for the 7040/7044 and 7090/7094 computers. Other manufacturers can be expected to follow suit, with announcements beginning by late summer.

To keep current 7000 users "on the air" during reprogramming, IBM is offering on the System/360 simulator packages for the 7070/7074, 7040/7044, and 7090/7094 computers. But these computer mimicking techniques do not take advantage of the full capability of the System/360...often processing instructions at speeds only comparable to the simulated computer. Conceivably, IBM could develop an automatic program translator from 7000 series computers to System/360, using a giant computer on a service bureau basis. However, software development costs for this method might be in the vicinity of $5 million, and it is likely that IBM would choose this method unless compelled to do so by competitive pressure. A better measure of the level of this competitive pressure should be available by mid-summer, and we will report further developments on this subject in upcoming issues.

Among the new products to expect from IBM in coming months is a key punch with a small internal storage...designed to hold frequently used code or account numbers and other data that occur frequently in key punching operations. Also, IBM is expected to announce this fall a new series of keyboard data entry devices for low cost data inquiry/collection in such applications as retail order recording, credit checking, etc.

Financially, IBM had a most impressive first quarter. Consolidated gross income was $931,734,938, nearly 25% over the same period in 1963. Net earnings in the period were $114,823,737, an impressive 46% over the same period in 1963. This large increase in sales was primarily due to the recent group purchase of computers by the Federal Government...resulting in a lump sum payment to IBM of approximately $150 million (see March 23th issue). Chairman Watson cautioned stockholders to bear in mind that due to the government purchase, first quarter income did not represent a rapid acceleration of the company's growth...and most likely the first quarter income in 1965 would not show an increase when compared to the current quarter.

Stockholders at the meeting approved a 25% stock split, and also a payment of $1.25 as a quarterly dividend per share on the capital stock outstanding after the stock split.

Putting its increased quarter income to use, IBM paid off a $160,000,000 long-term debt due the Prudential Insurance Co., and settled the core memory plane patent dispute with M.I.T. with a $13,000,000 payment.

NEWS ON SOME OTHER COMPUTER MANUFACTURERS

Burroughs Corp.: President Ray Eppert reported revenue for the first quarter of $87,563,000, a decline of 3% from the same period in 1963. Earnings, however, were up 10% for the period, rising to $1,722,000. Decreased military billings was given as the reason for the decline in revenue.

Eppert stated that Burroughs received more computer orders in March than in any month since the company entered the computer field over ten years ago...new orders concentrated on the B5000 and B200 computers. April ran a close second to this record, another company spokesman added. Orders for the company's newly announced B100 series have apparently been substantial enough to warrent reopening of production of the model 0 B200 processor which forms the nucleus of the system... originally the company planned to fill B100 orders with B200 processors returned from customers who had been upgraded to faster equipment.

Collins Radio Co.: President Arthur A. Collins started the new generation of compatibility announcements when he disclosed that the machine language package for Collin's 8400 computer would be compatible with the IBM System/360...in fact, he called on other computer manufacturers to adopt the System/360 language concept as an "industry standard"...indicating that Collins feels that IBM's market share of EDP and its huge resources allow it to "rewrite the rules" on EDP system design with its System/360. The microprogramming capability of the C-8400 allows relatively facile development of a System/360 compatible language structure. Main applications to date of the C-8400 have been in message switching...an area where language compatibility with frequently used computers is an important marketing requirement.

Control Data Corp.: With the last input/output specification change on the giant 6600 computer now out of the way, famed advanced computer designer Seymour Cray is again at work on a bigger and faster computer at Control Data's isolated Chippewa Falls Laboratory...and with good reason, for IBM is pushing its super-scale model 90, as yet unannounced officially, at every likely prospect for the 6600, according to a Control Data spokesman...and with some success in delaying orders for the 6600 until IBM comes through with more details on the 90...in particular, the delivery date.

Control Data can be expected to come up with a large core storage unit in the near future to rival the System/360's 8 million character core storage unit. Control Data will make this unit in-house...even if it means buying out a memory-making firm such as Fabri-Tek to do it. The low end of the 3600 family, the 3100, will be announced between the end of May and the middle of June, according to current plans. It will be in the $4000 per month rental range.

Digital Equipment Corp.: DEC unwrapped its newest computer, the PDP-7, at the recent SJCC...the computer features a 1.75 usec. memory cycle time and 4.4 usec. multiply time for about $72,000 purchased (18 bit word and 8K core). It should be a strong competitor in the small scientific computer market described for the CCC DDP-224 in our April 15th issue.

General Electric: GE gave private briefings to the press at the SJCC on their as yet unannounced Compatible/600 family of computers. In doing so, they revealed an admirably integrated series of aerospace, military and commercial computer systems designed to be major candidates for the computing and control equipment in military and/or space command/control systems. To this end, GE's Light Military Electronics Department has developed four micro-miniaturized aerospace computers, the A-212, A-224, A-218, and A-605. The A-605 is program compatible with the M-605 and M-625, two ground-based military computers. The M-625 is the commercial GE-625 in military dress. The GE-625 and GE-635 are the commercial computers, offering a 2 usec. and 1 usec. core cycle times respectively...with a 36 bit word. Software is mass storage oriented...

GE is still working on their thermoplastic mass memory system...FORTRAN IV will be included in the software, and the 36 bit word suggests some interesting possibilities for program translation for users of the IBM 7040/7044 and 7090/7094 computer systems. At the moment the marketing effort on the 600 family is being concentrated in NASA and the Pentagon...the commercial marketing force having their hands full with the 400 family...especially the rapidly moving 415. If the military marketing effort goes well, we expect to see the official announcement of the 600 family in a few months. If it goes poorly, it is possible that GE will never officially offer it for commercial sale.

GE revealed an early sign of its efforts to make its peripherals in-house... considered an essential for any manufacturer desiring to stay for the long haul in the computer market..(example: over one-half the cost of a GE-415 system is in the peripherals)..when it showed its self-built tape transport proto-type at the recent SJCC. It should be able to make deliveries of its own tape transports by this fall.

Honeywell: The H-200 was given its first public demonstration at the recent SJCC...the 1401 to 200 machine code-to-code conversion routine BRIDGE was the feature of the presentation...Honeywell claims that only 1% of the 1401 instructions need hand-coding following the BRIDGE routine. In order to take advantage of the 200's simultaneous I/O capability, double buffering of I/O memory areas is required, so the user needs 4K more storage in the 200 than he needed in his 1401...at a cost of $250. per month.

Honeywell claims to have only lost a few orders for the H-200 following the System/360 announcement...and to have picked-up quite a few new ones. Ordering on the newly introduced H-300 is slow getting started...the hasty announcement decision in mid-April apparently hindered coordination with the marketing force. The H-300 offers a 1.75 usec. main memory and a .5 usec. control memory...fixed point add time is 7 usec...monthly rentals start at $2,200...important feature of the H-300 is a "family interface" unit which permits it to be directly connected to its own or any of 30 different I/O devices of the H-200, or to the central processing unit of the H-200, thus allowing the computers to share common peripheral terminals. The H-300 should give Honeywell a good position in the IBM 1620 market and Control Data 160/160A market...at least until the announcement of the Control Data 3100 which replaces the 160A line. Honeywell's upcoming expansion into the medium to large computer area with its H-200 concept is detailed in the IBM report in this issue...the announcement date for these two new computers currently set for May.

Financially, Honeywell reported first quarter sales of $157,607,388, up 7% from the same period in 1963. Earnings for the period were $8,260,043, up 34% from last year. As with other computer builders, the recent government computer purchases aided the first quarter earnings picture...we estimate that Honeywell picked up about $3.5 million from the government purchase arrangement.

National Cash Register: NCR is expected to introduce a new small computer shortly. It is rumored to be the NCR 365, and presumed to lie in the $900 to $1500 per month rental range...competitive with the Burroughs E2100, the Univac 1004, the Friden 610, Monrobot XI and IBM 6400.

Financially, NCR's sales increased 12% in the first quarter, up to $140,757,000, while net income showed an 8% increase, rising to $3,844,636. Chairman Oelman noted that the company's investment in rented EDP systems continues to rise...being $75 million by the end of the first quarter of this year.

Scientific Data Systems, Inc.: SDS joined hands with Beckman Instruments,Inc. to offer what it claims is the first fully integrated hybrid computing system...a

unit which combines an SDS 910, 920, 930 or 9300 digital computer with a Beckman 2220 or 2230 analog computer. A 920/2220 hybrid system was demonstrated to the press at the recent SJCC...the unit has a price tag of $300,000, with a delivery time of six to nine months. Other hybrid combinations range in price from $100,00 to $1,000,000...the principal market is the aerospace field for vehicle simulations and engineering design work...according to Beckman the market estimate for the new hybrid systems for 1964 is ten units. Both SDS and Beckman will have marketing responsibility for the Beckman/SDS Integrated Computer System.

The Beckman/SDS combination virtually completed the round of contractual agreements between analog and digital computer manufacturers to develop hybrid computers. Electronic Associates and Computer Control, Computer Products and Packard-Bell, Applied Dynamics and Digital Equipment, and Computer Systems and Control Data have all linked equipment to form hybrid units. The first two pairs have formal agreements, while the remaining pairs are informally cooperating as of the current time. President Max Palevsky of SDS commented to us that his agreement with Beckman does not preclude his selling digital computers to other analog computer manufacturers.

The market estimate for the hybrid computer field this year is in the neighborhood of $10 million.

BUSINESS AND FINANCIAL ON OTHER EDP FIRMS

Potter Instrument: One of the major recovery situations in the financial side of the EDP field this year lies with Potter Instrument (Amex), we feel. As a maker of computer peripheral devices, Potter serves a shrinking market as more and more EDP system builders begin to make their peripherals in-house. However, Potter has developed a high-speed printer/plotter which has the capacity to print alphanumeric characters at 1000 lines per minute and also plot fine curves and reproduce forms at 30 points per inch. For the computer user who has between 2% to 20% of his work on scientific/engineering applications where plotting is frequently required, this dual capability can be a considerable saving in cost. Potter has also recently introduced several new peripherals at the SJCC including an incremental tape transport, a tape station which time-shares groups of tape transports, and a militarized paper tape reader. Potter is the only independent source of supply for several of these new units.

The real boost for Potter should come, we feel, when they introduce their cartridge loading mass memory system in the fall of this year. This unit is planned to have a storage capacity of about 4 million characters per cartridge... each cartridge holding an array of continuous loops of magnetic tape. The storage cost for the system should be about .4¢ per character, with an average access time of 150 msec. per record. This unit would seem to have considerable advantages over the disc pack devices being developed by other independent peripheral firms such as ANelex...thereby making Potter one of the leading, if not the primary, supplier of fast access mass memory devices for business applications, such as where NCR's CRAM magnetic card system and the IBM 1311 disc pack system are finding considerable use, on an independent basis.

Potter's order backlog is at an all-time high, being $7 million as of March 31th compared to $4.4 million at the start of the last fiscal year in July, 1963. For the first 36 weeks of the fiscal year, ended March 7th, Potter reported R&D expenses of $1,089,000 for new product development. This large expenditure resulted in decreased earning for the period, being $207,000 versus $467,000 for the comparable 1963 period. Sales were also off 12%, falling to $7,347,000 for the period. This situation should be sharply reversed when deliveries on the several new products get into full activity by this fall.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF APRIL 27, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	17	7
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	16	2
	ASI 2100	Y	$3000	12/63	3	4
Autonetics	RECOMP II	Y	$2495	11/58	70	X
	RECOMP III	Y	$1495	6/61	19	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	10	1
	RW-300	Y	$6000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$6000	12/63	3	8
	TRW-530	Y	$6000	8/61	22	4
Burroughs	205	N	$4600	1/54	65	X
	220	N	$14,000	10/58	45	X
	E101-103	N	$875	1/56	132	X
	E2100	Y	$535	8/64	0	165
	B100	Y	$2800	5/64	0	32
	B250	Y	$4200	11/61	45	12
	B260	Y	$3750	11/62	72	57
	B270	Y	$7000	7/62	64	49
	B280	Y	$6500	7/62	85	53
	B5000	Y	$16,200	3/63	30	23
Clary	DE-60/DE-60M	Y	$525	2/60	206	6
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$3080	5/63	22	18
	DDP-224	Y	$3300	11/64	0	1
Control Data Corporation	G-15	N	$1000	7/55	304	X
	G-20	Y	$15,500	4/61	27	X
	160/160A	Y	$1750/$3000	5/60 & 7/61	358	15
	924/924A	Y	$11,000	8/61	27	6
	1604/1604A	Y	$35,000	1/60	58	11
	3600	Y	$52,000	6/63	15	24
	3400	Y	$32,000	11/64	0	16
	3200	Y	$9000	5/64	0	48
	6600	Y	$150,000	4/64	1	2
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	50	6
	PDP-4	Y	Sold only about $60,000	8/62	26	9
	PDP-5	Y	Sold only about $25,000	9/63	30	25
	PDP-6	Y	Sold only about $300,000	7/64	0	4
	PDP-7	Y	Sold only about $72,000	10/64	0	1
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	25	X
Friden	6010	Y	Sold only about $22,000	6/63	101	82
General Electric	210	Y	$16,000	7/59	74	2
	215	Y	$5500	11/63	18	3
	225	Y	$7000	1/61	165	6
	235	Y	$10,900	12/63	9	9
	415	Y	$5500	10/64	0	100
	425	Y	$7500	7/64	0	35
	435	Y	$12,000	10/64	0	18
	455	Y	$18,000	6/65	0	9
	465	Y	$24,000	6/65	0	5
General Precision	LGP-21	Y	$725	12/62	102	50
	LGP-30	semi	$1300	9/56	430	2
	RPC-4000	Y	$1875	1/61	99	2

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell Electronic Data Processing	H-200	Y	$4200	3/64	5	530
	H-300	Y	$3900	7/65	0	4
	H-400	Y	$5000	12/61	93	22
	H-800	Y	$22,000	12/60	60	4
	H-1400	Y	$14,000	1/64	5	10
	H-1800	Y	$30,000	1/64	3	8
	DATAmatic 1000	N	---	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3600	12/57	550	X
	360/30	Y	$4200	7/65	0	450
	360/40	Y	$9600	7/65	0	180
	360/50	Y	$18,000	9/65	0	150
	360/60	Y	$35,000	10/65	0	80
	360/62	Y	$50,000	11/65	0	15
	360/70	Y	$80,000	10/65	0	80
	650-card	N	$4000	11/54	420	X
	650-RAMAC	N	$9000	11/54	85	X
	1401	Y	$4500	9/60	6800	700
	1401-G	Y	$1900	5/64	0	850
	1410	Y	$12,000	11/61	305	175
	1440	Y	$1800	4/63	850	1800
	1460	Y	$9800	10/63	210	420
	1620	Y	$2000	9/60	1490	40
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	33	33
	702	N	$6900	2/55	2	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	45	X
	7040	Y	$14,000	6/63	36	42
	7044	Y	$26,000	6/63	25	15
	705	N	$30,000	11/55	90	X
	7070, 2, 4	Y	$24,000	3/60	475	85
	7080	Y	$55,000	8/61	65	15
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	65	4
	7094	Y	$70,000	9/62	255	40
	7094 II	Y	$76,000	4/64	10	100
ITT	7300 ADX	Y	$18,000	7/62	8	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	165	X
	Monrobot XI	Y	$700	12/60	375	180
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	0
	- 310	Y	$2000	5/61	45	1
	- 315	Y	$8500	5/62	165	105
	- 390	Y	$1850	5/61	570	190
Packard Bell	PB 250	Y	$1200	12/60	152	11
	PB 440	Y	$3500	3/64	2	11
Philco	1000	Y	$7010	6/63	15	8
	2000-212	Y	$52,000	1/63	6	5
	-210,211	Y	$40,000	10/58	18	5
Radio Corp. of America	Bizmac	N		-/56	4	X
	RCA 301	Y	$6000	2/61	405	150
	RCA 3301	Y	$20,000	7/64	0	10
	RCA 501	Y	$15,000	6/59	95	4
	RCA 601	Y	$35,000	11/62	3	2
Scientific Data Systems Inc.	SDS-910	Y	$2000	8/62	53	42
	SDS-920	Y	$2700	9/62	42	16
	SDS-930	Y	$4000	4/64	1	14
	SDS-9300	Y	$7000	4/64	0	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	34	X
	Solid-State II	Y	$8500	9/62	40	5
	III	Y	$20,000	8/62	64	75
	File Computers	N	$15,000	8/56	42	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	345	1
	418	Y	$11,000	6/63	4	7
	490	Y	$26.000	12/61	30	25
	1004	Y	$1900	2/63	1200	1100
	1050	Y	$8000	9/63	40	260
	1100 Series (except 1107)	N	$35,000	12/50	16	X
	1107	Y	$45,000	10/62	18	15
	LARC	Y	$135,000	5/60	2	X
				TOTALS	18907	9037

X = no longer in production. To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the 7044, 7074, and 7094I and II are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 10 - April 24, 1964

	1964 High	1964 Low	3 weeks Sales In 100s	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	45 7/8	1380	51 3/8	45 5/8	45 7/8	-2 1/8	-4.43
American R & D	27	21 3/4	211	24 3/4	23 1/4	23 3/4	+1/4	+1.06
Burroughs	25 3/8	22 1/4	1058	24 1/8	22 3/8	22 1/2	-1 1/8	-4.76
Control Data	106 3/8	74 1/4	4658	97 3/4	77 1/4	86 3/4	+8 1/2	+10.86
Electronic Associates	60 5/8	45 1/4	568	58 1/4	48 1/4	48 3/4	-4 3/4	-8.88
General Dynamics	31 5/8	23 1/2	2126	29 5/8	26 1/2	26 1/2	-2 1/8	-7.42
General Electric	90 5/8	84 1/2	1924	88 3/4	84 5/8	84 7/8	-3 3/4	-4.23
General Precision	32 3/8	25 3/4	807	29 1/2	27 1/4	27 1/4	-5/8	-2.21
IBM	601 1/2	507 1/2	1153	601 1/2	579 1/4	583	-15 1/2	-2.59
Inter. Tel. & Tel.	60	52 5/8	1694	60	56 1/4	56 1/4	-7/8	-1.53
Litton Industries	79 5/8	64	1960	72 7/8	66 3/4	66 7/8	-3 1/8	-4.46
Minneapolis-Honeywell	148 3/4	115 1/4	1562	130 3/4	118 1/2	125 1/2	+3 1/4	+2.66
Nat. Cash Register	79 3/4	69 3/4	746	74	69 3/4	71 1/4	-2	-2.74
Packard Bell	15 1/2	10	188	12 1/4	10	10	-1 1/8	-10.11
RCA	39 1/4	33	10,905	37 1/8	33	33 1/4	-2 1/8	-6.01
Sperry Rand	21 3/4	16 1/8	9358	19	16 1/8	16 1/8	-1 3/4	-9.94
Xerox	97 3/8	70	6603	97 3/8	85	93 7/8	+8 3/8	+9.78
NYSE COMPUTER STOCK AVERAGE				88.76	81.73	83.66	-1.21	-3.79
AMERICAN STOCK EXCHANGE								
Anelex	44	27 1/2	266	32 3/4	30	30	-1/2	-1.64
Clary	7 1/2	5 3/4	138	7 1/8	6 1/8	6 1/8	-1/4	-3.92
Computer Sciences	29 5/8	21 1/4	145	25 5/8	23	23	-1 1/8	-4.66
Potter Instrument	12 1/4	7 3/4	191	10 1/2	8	8	-1 3/4	-17.95
Teleregister Corp.	12 1/2	7 5/8	1916	12 1/2	10	10 1/4	-1 1/8	-9.89
AMEX COMPUTER STOCK AVERAGE				17.70	15.43	15.48	-.95	-7.61

	1964 High Bid	1964 Low Bid	April 24 Bid	April 24 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	13 3/8	14 3/8	12 3/8
Computer Control	17 3/8	12 3/4	15 7/8	17	16 1/2
Data Products	8 1/8	3 5/8	4 3/8	4 7/8	4 1/2
Digitronics	20	12 1/4	13 1/8	14 1/4	15
Dura Corp.	38	31 3/4	36 3/4	38 7/8	35 1/2

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May 15, 1964 Vol. 1, No. 4

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Mergers Bring Two More Major Corporations Into EDP Field.....Page 5

E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

BUSINESS FORMS INDUSTRY...WED TO EDP...FACES ERA OF CHALLENGE

An Industry in Transition

The advent of the computer-controlled typewriter and the high-speed printer for recording the results of EDP operations has presented the business forms industry with its greatest growth area, and also its greatest challenge. The growth has been impressive: in the past five years sales have increased 11% a year for EDP-related continuous forms alone...total annual sales for the industry have now exceeded $1.1 billion. However, the generally conservative business forms industry, once the fountainhead of "business systems", now finds itself more and more vassal to the EDP industry. This new relationship molds the features of its current outlook: sharpened competition, rapid technological obsolescence, and tightening profit margins.

Diverse specific factors underlie this picture. First, there have been important recent advances in printing technology. Photo offset lithography has become dominant, and the still newer "dry-offset" has caused a total reassessment of present equipment. Electronic data processing's increased use of continuous forms has broadened the profit edge for large manufacturers. New materials and techniques are challanging the traditional standby, the one-time carbon interleaved form. Besides NCR paper, six or eight other carbonless papers are now being used in both continuous forms and unit sets. Attacking carbon use from the other side, the fast-growing copying machine and duplicator industries are producing equipment which offer another alternative to copy requirements for business documents.

Degree of Concentration

Because of the factors mentioned above, the business forms industry reflects many of the characteristics of the EDP industry of several years ago: frequent mergers and complex technological requirements resulting in the dominance of a few large companies. We find that the general industry heirarchy is as follows:

1) continuous forms manufacturers which specialize in printing, interleaving, collating, fastening, punching, and otherwise processing paper from roll to roll or roll to "zig-zag folded" flat packs. There are now about 350 such manufacturers in the United States according to recent estimates.

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2) firms specializing in business forms limited to gum-padded forms, unit sets, register, and peg-board forms.

3) a vast number of job printing firms which produce forms as a side-line or at the special request of their customers (such firms are not generally counted in as part of the industry).

From the standpoint of marketing, the industry falls into three well-defined groupings. A number of the larger manufacturers market solely through branch sales offices. The largest (Moore Business Forms, subsidiary of Moore Corporation Ltd.) has close to 500 branch offices in the United States and Canada. A larger number of manufacturers market through independent forms dealers in certain geographic areas, and through their own sales offices in territories which can be considered local. Finally, there are a number of large manufacturers who have no direct sales, but market almost entirely through independent forms dealers. Philip Hano Co., American Business Systems, and Ennis are three of the largest of this group. Of significance is the good bit of rivalry, sometimes bitter, between what can be considered a "dealer camp" and the "direct sales" camp.

The total forms market in the United States is divided up about as follows:

50% held by the "big three" direct sales manufacturers
(Moore, Standard Register, and UARCO)
25% held by other direct sales manufacturers
25% held by independent forms dealers

Rapid Growth

The U. S. Department of Commerce began compiling sales figures on the business forms industry as a separate industry only in 1958. Sales volumes (in millions of dollars) have been published by the department for the years 1958 through 1962.

Product	1958	1959	1960	1961	1962
Cont. Forms	169.209	189.409	206.819	222.186	250.323
Unit Sets	159.551	173.171	172.973	188.744	204.294
Salesbook & Other	45.235	49.257	50.838	48.693	55.311
Total "Pure" Manifold	373.995	411.837	430.630	459.623	509.928

This growth in the percentage of continuous forms has placed increasing pressure upon the small manufacturer as well as the large, established firm which is not alert to, or not able to respond to this trend. The result has been increased activity in the way of mergers and acquisitions. When Allied Paper Corporation decided to go into the forms business several

years ago, it had little difficulty in finding available firms. Some were pioneer firms in the industry. During the years 1960 and 1961 Allied acquired The Egry Register Company, Stephen Greene Company, American Register Company, Connecticut Manifold Forms Company, Charles E. Brown Printing Company, and Arthur J. Gavrin Press, Inc.

Individual company growth is difficult to portray since during the last decade consolidation on the scale described above has been characteristic of the forms industry. The same causes have lead to a pattern wherein one large firm has far outpaced the rest of the industry, followed at a distance by two near-giants. Since these "big-three" represent half of the total business forms volume, an examination of their earnings will give scale for the industry as a whole.

The figures given below include equipment as well as business forms.

		1963	1962	1961
Moore Corp. Ltd, Toronto (incl. subs. Moore Business Forms, Inc., Niagara Falls, N.Y.) (NYSE)	net sales	$190,099,574	177,933,084	161,765,658
	earnings per comm. share	2.28	2.12	1.94
The Standard Register Company Dayton, Ohio (OTC)	net sales	$ 65,099,574	65,317,352	58,034,072
	earnings per comm. share	1.41	1.77	2.91*
Uarco, Incorporated Barrington, Ill. (OTC)	net sales	$ 51,263,940	49,484,029	44,612,944
	earnings per comm. share	1.49	1.63	5.53**

* $1.46 on 2,117, 436 shs. adj. for 2-for-1 split, 5/62
** $1.47, adj. for 4-for-1 split 12/61

Healthy Medium-Sized Firms

Two business forms manufacturers who do not number among the giants might justifiably be singled out as enjoying an above-average growth. Their progress will no doubt continue due to an alert management with a philosophy which, unlike that of many firms, seeks to capitalize on change rather than to fear it.

	The Reynolds and Reynolds Co. Dayton, Ohio (OTC)		Wallace Business Forms (Formerly Wallace Press) Chicago, Illinois	
Year	Net Sales	Earn. Per Com. Shr.	Net Sales	Earn. Per Com. Shr.
1963	$ 17,710,697	2.22	$ 17,527,698*	1.81
1962	15,861,725	1.89	14,288,936	1.54
1961	14,167,844	1.05	11,966,284	1.41
1960	13,951,105	1.42	11,920,144	1.52
1959	12,753,308	1.22	11,209,704	1.36
1958	11,327,469	.89	11,236,928	1.44

*Reflects merger with Standard Business Forms, July 31, 1963

Frank Pfeiffer, Vice President of Reynolds and Reynolds, claims that the growth of his firm is no accident, but the result of applying management policies which are often neglected in the business forms industry.

For example, while other firms are working on forms construction gimmicks or lower prices, Reynolds & Reynolds tries to put the emphasis on superior service by developing salesmen with an unusually good knowledge of business systems--men who can examine customers' business procedures and recommend more efficient systems--based on Reynolds & Reynolds forms. Second, the firm applies progressive marketing techniques: a "rifle-shot" rather than shotgun approach is used. For example, Reynolds & Reynolds has established two divisions to cater to two specific markets it considers rapidly growing in the use of forms: an Automotive Division and Hospital Division. Thus, through association with growing markets, the firm itself is assured of growth.

Among other firms having a measurable share of the business forms market are:

Adams Business Forms	Topeka, Kans.
Allied/Egry Business Systems (Subs. Allied Paper)	Dayton, Ohio
American Business Systems	Philadelphia, Pa.
Autographic Business Forms, Inc.	S. Hackensack, N.J.
Baltimore Business Forms	Baltimore, Md.
Bonnar-Vawter, Inc.	Keene, N.Hamp.
Clarkson Press (Graphic Controls)	Buffalo, N.Y.
Consolidated Business Systems (Subs. Diebold)	New Brunswick, N.J.
Ennis Business Forms	Ennis, Texas
Forms, Inc.	Willow Grove, Pa.
Hamilton Autographic Register Co.	Hamilton, Ohio
Philip Hano Company	Holyoke, Mass.
Shelby Business Forms	Shelby, Ohio
Sturgis-Newport Business Forms	Sturgis, Mich.
Victor Business Forms (Subs. Victor Comptometer)	Lincoln, Nebr.

The Future

Growth in the area of continuous forms can be linked directly to the recent tremendous growth in electronic data processing. Projections for the future often place this relationship on a "one-to-one" basis. There are certain aspects of new developments in EDP, however, which indicate that the rate of growth in forms will not parallel electronic data processing.

Increased use of data transmission and on-line processing will cause the volume in high-cost multiple-ply forms to go down in relation to unprinted one-ply forms, which are a low-cost item. The highly touted fully integrated management control system, although it seems long in coming, will finally be a reality in the largest corporations. Such systems by-pass the human being as much as possible ("management by exception")--hence a good volume of forms are by-passed as well.

Here today is computer output in the form of microfilm rather than "hard copy". Service bureaus using the General Dynamics 4020 Microfilm Recorder are already in existence to convert magnetic tape directly to film in New York and Washington, D.C. The Social Security Administration is urging all firms to submit quarterly reports of their employees' earnings on magnetic tape rather than on business forms.

For console monitoring of computers the cathode ray tube display is becoming more and more common. For such "quick-look" applications such an approach has many advantages over a typewriter printing out on forms. IBM's new System/360 features such a device; Control Data's largest systems provide display as a standard feature.

Finally, as mentioned above, copying and duplicating processes in certain areas compete with business forms. More and more masters are being built into business forms--continuous and otherwise--which permit the proliferation of many more copies than are possible with the traditional carbon interleaves.

It is important to note that these trends will not cause the volume of forms to level off or decrease. They will only tend to retard growth. The paper explosion is here to stay, apparently--and a growing business forms industry will continue to feed it.

MERGERS INDICATE ENTRY OF TWO MORE MAJOR CORPORATIONS INTO THE COMPUTER FIELD: MARTIN MARIETTA, UNION CARBIDE

Martin Marietta signalled a major attempt to broaden its position in the computer field by announcing that an agreement has been reached in principle by which the assets and business of the Teleregister Corp. and the 90% MM owned Bunker-Ramo Corp. will be combined.

Under the proposed program, Teleregister will issue an additional 4,939,000 shares of stock, of which 1,400,000 shares will be sold to Martin Marietta and Thompson Ramo Wooldridge for cash at $15 per share or $21,000,000, and the balance will be issued to acquire all the assets of Bunker-Ramo. Ownership of the enlarged firm will be vested 34.7% with existing Teleregister stockholders, and the balance with MM and TRW. MM's 90% ownership of Bunker-Ramo will mean that it will retain 58.8% ownership in the new enterprise.

The proposed merger will be effective after execution of detailed written agreements and approval by stockholders of both corporations.

Bunker-Ramo was formed earlier this year by the combination of the Computer and Numerical Control Division of TRW and the Electronic Systems and Products Division of MM. B-R currently has over 1200 scientists and technicians on its staff, and is a world leader in the development of on-line process control computer systems.

We find the new arrangement not unexpected...John Parker, President and Chairman of Teleregister, has been a board member of MM for several years, and is a close friend of MM President George Bunker. Parker has actively been seeking an affiliation with a larger company for Teleregister since the lack of an adequate marketing force has hindered his company's growth in recent years.

When Parker heard that the Rockefeller interests who backed Scantlin Electronics, Teleregister's prime competitor in the brokerage information field, had approached George Bunker to interest him in the possibility of acquiring Scantlin, Parker quickly countered with facts to show that his firm was a more favorable acquisition than Scantlin...and apparently won his point.

Teleregister of late has been making a distinct move toward becoming a peripheral equipment supplier for EDP system builders...their window machine for savings banks is being incorporated into proposals by RCA, Univac, GE and Honeywell...their model 100 and 200 CRT displays have received favorable attention from O.E.M.'s, e.g., Univac is using several in their service centers. The merged firm should be able to move toward complete system development in several markets with the East Coast group (Teleregister) specializing in peripheral equipment and the West Coast group (B-R) developing the central processors.

Immediate advantage to MM of the new enterprise: a strengthened position in bidding on command and control systems for national defense, space exploration, and airway control, through Teleregister's lengthy experience in on-line information systems.

Next move for MM in its apparent drive to become a major factor in the development and marketing of computer and control systems may come before summer...logically, competence in data acquisition and reduction techniques is desirable, and we understand that Epsco, Inc. of Westwood, Mass. is being studied carefully...Epsco did about $4.7 million in sales last year largely from the development of such systems.

.....

Union Carbide Corp. made a quiet but significant move into the computer field by acquiring Data Systems, Inc., a Detroit-based builder of a small, general purpose digital computer selling for about $12,000.

Data Systems was established in Grosse Point, Michigan in May, 1962. Its sole product to date, the DSI 1000 computer, is a serial address, binary, stored program machine. The computer, which is small enough to fit into a file drawer, can be purchased as a single unit for incorporation into a control system designed by the customer. However, 11 peripheral devices are available to provide a complete computer system for specialized applications. Primary market to date for the DSI 1000 has been as a system control element in process control, communication control, medical electronics, and system checkout applications.

Since its introduction, the DSI 1000 has picked up orders valued at over $300,000...Data Systems had to call a moratorium on orders in mid-1963 to permit production capacity to catch up. Such a favorable market response apparently caught the eye of people at Union Carbide which has been expanding its activity in the electronics area in a deliberate fashion recently.

Data Systems will operate as a separate subsidiary of Union Carbide, but as with other electronics activities at UCC, DSI will be under the guidance and control of the corporation's Linde Division. We have learned that UCC will step up the sales promotion activities of DSI considerably in the months ahead, and may have an expanded version of the DSI 1000 ready for introduction by mid-fall.

A Union Carbide spokesman was careful to state that UCC is not considering competition with IBM, CDC or the major firms in the industry by entering the general purpose computer field as such, but rather is specializing for the time being in the system control computer market now being served by firms such as Digital Equipment, Scientific Data Systems, Computer Control (see profile, April 15th issue), and Pacific Data Systems.

Other Mergers Planned Or Rumored

The directors of Digitronics Corp., manufacturer of data communications systems and computer peripheral equipment, and Atlas General Industries, Inc. have authorized the purchase of 240,000 shares of new Class A Digitronics stock for $6 million in cash. An Atlas spokesman said that the Class A stock would be converted into sufficient Digitronics stock to give Atlas majority control of Digitronics. The plan is subject to approval by current shareholders of Digitronics. The directors of Atlas have in turn approved a plan to merge Atlas into Consolidated Electronics Industries Corp. Atlas is primarily in the plywood business (1963 sales: $14 million) and has holdings in Dialight, a manufacturer of indicator lights for control systems. Consolidated Electronics Industries Corp. makes electronic, electrical and electromechanical products (1963 sales: $133 million). Digitronics recorded $4,187,075 in sales in the fiscal year ended on March 31, 1963.

Computer Applications Inc., a leading computer programming and data processing service bureau concern, has acquired a majority interest in the stock of Orchard-Hays & Company, a Washington, D.C. firm specializing in the application of mathematical techniques to the solution of business and industrial problems. President of the acquired firm, William Orchard-Hays, will become a vice president of CAI. He was formerly vice president of C-E-I-R, Inc. and has been a pioneer in the application of advanced linear programming systems. The Orchard-Hays firm will remain the Washington, D.C. and will serve as a base of operations for CAI in that area.

We understand that Control Data is negotiating with management people at C-E-I-R, Inc. for the acquisition of that firm. This would put Control Data firmly into the service bureau business...a position it has been striving after for some time. C-E-I-R is currently the leading firm in the computer programming and data processing services field, with $18 million in sales in 1963...Another acquisition much discussed lately is the absorption of Royal McBee into the Litton Industries business machines group.

Things to look for: An expanded Univac 1107 computer possibly called the Univac 1112, to be introduced shortly...A PDP-8 computer from Digital Equipment, an improved version of the MIT LINC computer selling for about $45,000...An initial public offering of 387,975 shares of stock by Scientific Data Systems, with underwriters headed by Hayden Stone & Co....The first revelation of what IBM is going to do with all those returned 1401's, in our next issue.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 27 - May 8, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	44 1/8	857	47 3/4	44 1/8	46 3/4	+7/8	+2.40
American R & D	27	21 3/4	146	23 3/4	22 5/8	23 1/2	-1/4	-1.05
Burroughs	25 3/8	22 1/8	808	23 1/2	22 1/8	23 1/4	+3/4	+3.33
Control Data	106 5/8	74 1/4	2318	99 1/2	85	99	+12 1/4	+14.12
Electronic Associates	60 5/8	45 1/4	335	55	48 1/8	51 1/4	+2 1/2	+5.13
General Dynamics	31 5/8	23 1/2	1117	26 7/8	25 1/2	26 1/2	-----	-----
General Electric	90 5/8	81 7/8	1991	84 3/4	81 7/8	82 7/8	-2	-2.36
General Precision	32 3/8	25 3/4	348	27 1/2	26 5/8	26 7/8	-3/8	-1.38
Honeywell	148 3/4	115 1/4	925	134 3/4	120 1/2	132 1/4	+6 3/4	+5.38
IBM	601 1/2	507 1/2	513	588 3/4	570 1/4	584 1/2	+1 1/2	+0.26
Inter. Tel. & Tel.	60	52 5/8	850	58 7/8	55 1/4	58 3/4	+2 1/2	+4.44
Litton Industries	79 5/8	62 3/4	1389	67 3/4	62 3/4	64 7/8	-2	-2.99
Nat. Cash Register	79 3/4	66 1/2	565	72 7/8	66 1/2	68	-3 1/4	-4.56
Packard Bell	15 1/2	9	255	9 3/4	9	9	-1	-10.00
RCA	39 1/4	32 1/8	8079	35 3/8	32 1/8	33 1/4	-----	-----
Sperry Rand	21 3/4	15 5/8	5357	16 7/8	15 5/8	15 7/8	-1/4	-1.55
Xerox	100 1/2	70	3524	100 1/2	91 3/4	98	+4 1/8	+4.39
NYSE COMPUTER STOCK AVERAGE				86.71	81.16	84.97	+1.31	+0.92
AMERICAN STOCK EXCHANGE								
Anelex	44	27 1/2	166	29 7/8	28	28 1/4	-1 3/4	-5.83
Clary	7 1/2	5 3/4	105	6 5/8	6	6 1/4	+1/8	+2.04
Computer Sciences	29 5/8	19 1/2	195	22 3/4	19 1/2	20	-3	-13.04
Potter Instrument	12 1/4	7 3/4	58	8 1/2	7 3/4	8 1/2	+1/2	+6.25
Teleregister Corp.	13 3/4	7 5/8	2802	13 3/4	10 3/8	11 1/4	+1	+9.76
AMEX COMPUTER STOCK AVERAGE				16.30	14.33	14.85	-0.63	-0.16

	1964 High Bid	1964 Low Bid	May 8 Bid	May 8 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	10 3/8	11 1/4	13 3/8
Computer Control	17 1/2	12 3/4	17 1/2	18 5/8	15 7/8
Data Products	8 1/8	3 5/8	4 1/4	4 5/8	4 3/8
Digitronics	20	11 1/2	10 1/4	11 1/2	13 1/8
Dura Corp.	38	31 3/4	37	39 1/8	36 3/4

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INDUSTRY AND MARKET REPORT

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P. J. McGovern, Editor
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IBM STUDIES REUSE OF RETURNED 1401 PROCESSORS IN NEW, LOW COST COMPUTER; ALSO DEVELOPS HYBRID CIRCUITRY VERSION OF THE 7090 COMPUTER

From the time installations of its new System/360 computers begin in late summer of 1965, to the end of 1968, IBM can expect to have about 5000 used 1401 data processing systems returned from customers who currently have this equipment on a rental basis. This huge inventory of leased equipment, currently generating more than $20,000,000 per month in revenue, itself exceeds in income generating power all the computer installations of any of IBM's competitors.

Since most of the returned systems will have averaged about four years of installation time on a paying basis, IBM will have already earned back their investment in development, production and selling costs on these systems as well as its standard 40% return on this investment. However IBM is carefully studying ways to produce additional revenues from this equipment in the form of products that would not be directly competitive with its existing product line.

We understand that IBM's most likely move here is to incorporate the circuits in the central processor of the 1401, and its internal storage, into a new small computer designed for business applications, and planned for introduction next year. This computer, when surrounded with new low-cost peripherals for handling cards and paper tape now under development at IBM, will rent for $600 and $900 per month. Prototype models of this new small computer are believed to be operating at IBM's General Products Laboratory in San Jose, Calif. According to an executive at that location, the use of the parts from returned 1401 processors in a new small computer is "a distinct possibility. It is common knowledge that the circuit cards in the 1401 are standard products, and can be reconnected in many ways...you can draw your own conclusions."

In introducing such a machine IBM would not be the first computer manufacturer to repackage used computer hardware and give it a new name and a lower price. Burroughs' recently announced B100 computer series is composed of returned B200 processors which are surrounded by some low-cost peripheral devices. Control Data has recently made some slight modifications to its 160A computer and relabeled it the 8090

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control computer. The company plans to build 8090's from the ground up as well as refurbish used 160A's as they become available. The 8090 sells for only $29,000 compared to about $70,000 for a 160A when new.

The introduction of this machine would also be IBM's first entry into the very small general purpose computer market ($500 to $1200 per month)...an area currently finding many homes for computers made by Friden, General Precision, Burroughs, Clary, and Monroe. Only IBM's 6400 magnetic ledger card machine shares part of this market. Buying such a small computer is normally the first step into the computer field for the organization who has confined its data processing operations to the punched card calculating equipment. A capable computer in the $600 to $900 a month range using punched card equipment would conceivably have a market in the next five years for between 5000 to 7000 machines among the estimated 23,000 punched card installations in the United States. An indication of this market potential was highlighted recently when Burroughs announced that it had obtained over 600 orders, worth $15,000,000, for its low cost E2100 computer ($535 per month) within three months of its announcement date.

Since IBM will have already written off most of the development and production costs for this new small computer, it should be able to offer a computer with a data processing capability that enjoys a marked superiority to other low cost computers on the market in this price range.

We have also learned that IBM has developed a version of its 7094 computer using the same hybrid circuitry found in the System/360. This computer would offer to the 7090, 7094 I & II user the higher processing speeds obtainable with microelectronic circuitry in the System/360, yet would spare him the burden of shouldering the huge reprogramming costs involved in moving from a 7090 to the System/360 (see April 30th issue for a discussion of program translators for the IBM 7000 series). This computer is tentatively designated as the 7095, and it is in the price range of the 7094II ($76,000 per month). We believe that IBM will delay any announcement on this machine until it determines if enough members of the existing population of some 200 organizations which use about 330 7090 series computers can be persuaded to undertake the System/360's reprogramming costs in the near future. If enough can be, it is likely that the 7095 will never be officially announced as an alternative solution to the large IBM computer user straining for more computing capacity.

BURROUGHS CORP. ANNOUNCED THE FIRST MEMBER OF ITS 300 COMPUTER SERIES this past week, the B370, specifically designed to process bank checks and other financial documents...an area where the Burroughs 200 series has found the most receptive market. The B300 series will feature transistorized circuitry organized to give the computer line a considerable amount of multi-processing capability...allowing the computer to execute several programs or several parts of the same program simultaneously. Rental prices for the B370 start at $7,100 a month and run to $10,000, or slightly more than the existing B270...its ancestor in the banking computer field. Burroughs is claiming that the B370 is 30% more

productive in banking applications than any other system on the market. However deliveries will begin for the B370 in the third quarter of 1965, contemporaneously with the smaller machines of the System/360. Other members of the B300 series, including a B380 designed for real-time accounting in savings banks, are expected shortly.

CONTROL DATA HAS MADE TWO MAJOR STEPS INTO THE SMALL SCIENTIFIC AND systems computer market recently. The first was the rather quiet announcement of its 160G computer, a machine originally developed to expand the capacity of the 160A computers at Cape Kennedy for use in pre-flight checkout of space vehicle systems. However, the specifications of the 160G created enough general interest that CDC decided to give it full-scale airing in the marketplace.

The 160G uses a very fast 1.35 usec. internal memory, and is able to achieve a 7 usec. multiply time on its 13-bit word. As such, 160G may find considerable acceptance in specialized applications requiring real-time control of processes at very high speeds. However the 13-bit word length severely limits the usefulness of the machine in general purpose scientific, engineering and business applications. Control Data does have one strong sales story in the 160G...the computer is program compatible with the 160A. This provides a major market for the 160G as a replacement unit for the 200 or so 160A's currently installed. Typical monthly rental price for a small 160G is about $5200.

Control Data's major entry in the growing competition to capture a major share of the small scientific computer market will be the 3100 computer, expected to be announced shortly. This machine, a low end extension of the 3600 family, undoubtably will have a 24-bid word length, and an average add time of about 1.8 usec....equivalent in basic processing capabilities to the existing 3200 computer. The typical system rental price for the 3100 will be between $3000 and $4000 per month, the drop in price from the 3200 being mostly due to lower cost peripherals and smaller memory size. As such, the 3100 will be a very strong competitor for the SDS 930, Computer Control's DDP-224, Digital Equipment's PDP-1, and the newly announced Honeywell 300. In addition to having equivalent or faster processing speeds than its current competitors in the scientific, engineering and systems small computer market, the 3100 also has the advantage of being the low end of an existing upward expandable family of computers which offer program compatibility in data processing systems renting from $3000 to over $60,000 per month.

Control Data is planning its most impressive series of new computer announcements in its history this coming month when CDC fills several gaps in its 3000 computer family by announcing the 3300 and 3800 computer systems, in addition to the 3100 discussed above. Shortly after these announcements we anticipate that Control Data will make some dramatic price reductions within the 3000 family. These price cuts will be at least partially a reflection of the pricing of comparable computing power in the IBM System/360. However these new computer introductions, and price changes, also indicate to us a strong move by Control Data to gather a much larger share of the scientific, engineering and systems computer market prior to the time in mid-1965 when many prospects will have to definitely commit themselves on the System/360.

Control Data also has a reaction to IBM's super-scale model 90 member of its System/360...it is the 6800 computer which runs between four and five times faster than the 6600 due to improved multi-processing capability...its announcement can also be expected in June.

Control Data will expand its capability in the data transmission area by announcing its 8030 record transmission terminal this coming month. This unit is designed for the transmission of payroll, personnel, billings, job costs, and other scheduling information. This represents another addition to the data transmission capabilities that Control Data recognizes it has to have to play an important role in the process control and business data processing markets.

In our last issue we commented that Control Data was taking steps to expand its service bureau operations, and was holding discussions with C-E-I-R, Inc. about merger possibilities. Although these discussions broke off recently, Control Data did pick up a major service bureau in the Houston area when it arranged for the acquisition of Computer Laboratories, Inc., a subsidiary of Scientific Computer, Inc. for an undisclosed amount of Control Data stock. Computer Laboratories currently operates a 1604A computer and several 160A computers in serving customers in the petroleum industry, the business and scientific community, and the NASA Manned Spacecraft Center in Houston. Control Data is currently examining service bureau operations in San Francisco, Chicago and Boston with an eye for further acquisitions.

HONEYWELL HAS DELAYED THE ANNOUNCEMENT OF ITS 1200 COMPUTER, THE upward expansion of its popular H-200, until late in June. The unofficial reason is that the EDP marketing force is locked up at the current time firming up those stacks of letters of intent for the H-200 received before the announcement of the System/360. A description of the H-1200 appeared in our April 30th issue.

GENERAL ELECTRIC'S COMPUTER DEPARTMENT SET WHAT IS PROBABLY CLOSE to an all-time record in shortening the time between a major new computer announcement and its first delivery this past week. The Phoenix-based group managed to make first delivery on its 415 computer, the low end of their 400 family of computer systems, to a NASA facility within two months after its announcement date last March 30. At least part of the explanation for this speedy performance is the fact that the 415 is a close cousin of the 425 in the 400 family, differing from the 425 mainly in internal memory speed. Two additional 415's will be going to the computer's first commercial customer this coming month.

More significantly, GE will make its first entry into the low cost scientific and business computer market by introducing its 205 computer within the next two weeks. The 205 is essentially a 4K memory version of the 215, sharing the same processing speeds as the 215. However the rental cost of the minimum scientific and engineering configuration for the 205, with a paper tape reader/punch and a console typewriter, is only $1700 per month. A minimum business configuration, with a card reader/punch and low speed printer, rents for about $2650 per month.

The 205 is apparently designed to interest computer users who might already be using an IBM 1620 computer, applying it to a range of scientific problems as well as attempting to do some basic accounting work on it...a market estimated at about 1500 machines. Besides being about twice as fast as the 1620, the 205 offers a Card Program Generator software system which aids business and engineering firms in automating their punched card accounting procedures. As was mentioned in the Control Data comment in this issue, major computer firms find it highly desirable to develop a customer relationship with a firm when it is acquiring its first computer. A customer necessarily invests a considerable sum in developing the system analyses and programming to use properly a particular computer, and it is unlikely therefore that he would change computer brands when he is expanding or upgrading his existing installation. Computer salesmen call this "getting your equipment locked in" to the customer's way of operating his business.

Other hardware to expect from General Electric in the coming months will be two tape transports systems which will give GE its first in-house peripheral equipment capability in the magnetic tape transport area. The high performance unit will have a character transfer rate of 83,000/sec., and will rent for $830 per month. The lower cost transport will operate at about 40,000 characters/sec. The tape bit density for these speeds is 556 bits per inch. These introductions should enable GE to lower the cost/performance ratio for its 400 and 600 lines, and increase its profit margin on these computers.

SIGNIFICANT NEW COMPUTER ORDERS

Company	Address	Computer On Order	Expected Installation Date
Bauseh & Lomb, Inc.	Rochester, N.Y.	IBM 1410	April, 1965
BGS Shoe Corp.	Manchester, N.H.	IBM 1440	October, 1964
Central Maine Power Company	Augusta, Maine	H400	1965
Cincinnati Gas & Electric Co.	Cincinnati, Ohio	IBM 7074	1965
Computer Service, Inc.	Jacksonville, Fla.	IBM 1401	November, 1964
County of Orange	Santa Ana, Calif.	IBM 1460	January, 1965
Dollar Savings Bank	Bronx, N.Y.	IBM 1440	December, 1964
Flagstaff Liquor Co.	Perth Amboy, N.J.	IBM 1440	January, 1965
Keystone Auto Club	Philadelphia, Penn.	IBM 1460	January, 1965
Lever Brothers Co.	New York, N.Y.	IBM 1460	January, 1965
Mare Island Naval Shipyard	Valleso, Calif.	UNIVAC III	March, 1965
Marlin Rockwell Corp.	Plainville, Conn.	IBM 1401-G	October, 1964
McGraw-Hill Publishing Co.	Hightstown, N.J.	IBM 1460	December, 1964
Monarch Life Insurance Co.	Springfield, Mass.	H200	March, 1965
Rocketdyne	Canoga Park, Calif.	H200	January, 1965
Signode Steel Strapping Co.	Chicago, Illinois	IBM 1401	January, 1965
Social Insurance Agency	Suginamiku, Tokyo	IBM 1460	April, 1965
Sterling Movies USA	New York, N.Y.	IBM 1401-G	January, 1965
Titus Blatter & Co.	New York, N.Y.	IBM 1440	June, 1965
Wilmington Trust Co.	Wilmington, Del.	IBM 1460	December, 1964

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF MAY 28, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	16	7
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	18	2
	ASI 2100	Y	$3000	12/63	4	2
Autonetics	RECOMP II	Y	$2495	11/58	68	X
	RECOMP III	Y	$1495	6/61	18	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	11	2
	RW-300	Y	$5000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$7000	12/63	4	14
	TRW-530	Y	$6000	8/61	22	4
Burroughs	205	N	$4600	1/54	64	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	130	X
	E2100	Y	$535	8/64	0	625
	B100	Y	$2800	5/64	2	33
	B250	Y	$4200	11/61	47	13
	B260	Y	$3750	11/62	74	56
	B270	Y	$7000	7/62	65	46
	B280	Y	$6500	7/62	88	51
	B5000	Y	$16,200	3/63	32	24
Clary	DE-60/DE-60M	Y	$525	2/60	216	5
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	23	16
	DDP-224	Y	$3300	12/64	0	5
Control Data Corporation	G-15	N	$1000	7/55	304	X
	G-20	Y	$15,500	4/61	27	X
	160/160A	Y	$1750/$3000	5/60 & 7/61	362	14
	924/924A	Y	$11,000	8/61	28	6
	1604/1604A	Y	$35,000	1/60	57	2
	3600	Y	$52,000	6/63	16	25
	3400	Y	$32,000	11/64	0	17
	3200	Y	$9000	5/64	1	52
	6600	Y	$150,000	5/64	1	2
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	52	4
	PDP-4	Y	Sold only about $60,000	8/62	28	10
	PDP-5	Y	Sold only about $25,000	9/63	34	28
	PDP-6	Y	Sold only about $300,000	7/64	0	4
	PDP-7	Y	Sold only about $72,000	10/64	0	2
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010		Sold only about $20,000	6/63	115	100
General Electric	210	Y	$16,000	7/59	73	1
	215	Y	$5500	11/63	19	4
	225	Y	$7000	1/61	166	6
	235	Y	$10,900	12/63	10	8
	415	Y	$6300	5/64	1	95
	425	Y	$8500	7/64	0	36
	435	Y	$14,000	9/64	0	19
	455	Y	$19,000	6/65	0	10
	465	Y	$24,000	6/65	0	5
General Precision	LGP-21	Y	$725	12/62	107	55
	LGP-30	semi	$1300	9/56	445	4
	RPC-4000	Y	$1875	1/61	101	2

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell Electronic Data Processing	H-200	Y	$4200	3/64	7	490
	H-300	Y	$3900	7/65	0	8
	H-400	Y	$5000	12/61	95	18
	H-800	Y	$22,000	12/60	61	3
	H-1400	Y	$14,000	1/64	6	10
	H-1800	Y	$30,000	1/64	3	7
	DATAmatic 1000	N	---	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3600	12/57	540	X
	360/30	Y	$4200	7/65	0	550
	360/40	Y	$9600	7/65	0	210
	360/50	Y	$18.000	9/65	0	170
	360/60	Y	$35,000	10/65	0	85
	360/62	Y	$50,000	11/65	0	18
	360/70	Y	$80,000	10/65	0	90
	650-card	N	$4000	11/54	410	X
	650-RAMAC	N	$9000	11/54	82	X
	1401	Y	$4500	9/60	6950	750
	1401-G	Y	$1900	5/64	20	900
	1410	Y	$12,000	11/61	310	170
	1440	Y	$1800	4/63	900	1600
	1460	Y	$9800	10/63	255	480
	1620	Y	$2000	9/60	1480	30
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	35	31
	702	N	$6900	2/55	2	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	44	X
	7040	Y	$14,000	6/63	38	40
	7044	Y	$26,000	6/63	30	16
	705	N	$30,000	11/55	88	X
	7070, 2, 4	Y	$24,000	3/60	480	60
	7080	Y	$55,000	8/61	68	10
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	60	4
	7094	Y	$70,000	9/62	250	30
	7094 II	Y	$76,000	4/64	25	85
ITT	7300 ADX	Y	$18,000	7/62	8	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	160	X
	Monrobot XI	Y	$700	12/60	380	180
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	0
	- 310	Y	$2000	5/61	46	1
	- 315	Y	$8500	5/62	174	100
	- 390	Y	$1850	5/61	580	175
Packard Bell	PB 250	Y	$1200	12/60	153	10
	PB 440	Y	$3500	3/64	2	8
Philco	1000	Y	$7010	6/63	16	7
	2000-212	Y	$52,000	1/63	6	5
	-210,211	Y	$40,000	10/58	19	4
Radio Corp. of America	Bizmac	N		-/56	4	X
	RCA 301	Y	$6000	2/61	414	155
	RCA 3301	Y	$20,000	4/64	1	16
	RCA 501	Y	$15,000	6/59	96	4
	RCA 601	Y	$35,000	11/62	4	1
Scientific Data Systems Inc.	SDS-910	Y	$2000	8/62	59	38
	SDS-920	Y	$2700	9/62	45	8
	SDS-930	Y	$4000	5/64	1	14
	SDS-9300	Y	$7000	8/64	0	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	33	X
	Solid-State II	Y	$8500	9/62	41	4
	III	Y	$20,000	8/62	68	65
	File Computers	N	$15,000	8/56	40	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	344	1
	418	Y	$11,000	6/63	5	8
	490	Y	$26,000	12/61	32	24
	1004	Y	$1900	2/63	1250	1075
	1050	Y	$8000	9/63	47	260
	1100 Series (except 1107)	N	$35,000	12/50	15	X
	1107	Y	$45,000	10/62	18	14
	LARC	Y	$135,000	5/60	2	X
				TOTALS	19,342	9469

X=no longer in production. To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the 7044, 7074, and 7094I and II are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

May 11 - May 22, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	2 weeks Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	44 1/8	712	47 3/4	44 3/8	44 3/4	-2	-4.28
American R & D	27	20 3/4	123	23 5/8	20 3/4	20 3/4	-2 3/4	-11.70
Burroughs	25 3/8	22 1/8	927	23 3/4	22 1/8	22 1/8	-1 1/8	-4.84
Control Data	106 5/8	74 1/4	2281	105 3/8	98 1/8	103 3/8	+4 3/8	+4.42
Electronic Associates	60 5/8	45 1/4	303	54	48 1/4	52 1/2	+1 1/4	+2.44
General Dynamics	31 5/8	23 1/2	942	26 3/8	24 1/2	24 1/2	-2	-7.55
General Electric	90 5/8	80 5/8	2125	84 3/8	80 5/8	82 3/4	-1/8	-.15
General Precision	32 3/8	25 3/4	300	27 1/8	26 1/4	26 7/8	------	-----
Honeywell	148 3/4	115 1/4	664	140 3/8	133	139	+6 3/4	+5.10
IBM wi	494	458 3/4	1043	494	466 1/2	491	+21	+4.47
Inter. Tel. & Tel.	60	52 5/8	483	59	56 1/2	56 3/4	-2	-3.40
Litton Industries	79 5/8	61	1614	66	61	63 5/8	-1 1/4	-1.93
Nat. Cash Register	79 3/4	66 1/2	499	68 3/4	66 7/8	67 1/4	-3/4	-1.10
Packard Bell	15 1/2	7 7/8	328	9 3/8	7 7/8	9 1/4	+1/4	+2.78
RCA	39 1/4	32	6046	33 5/8	32	32 3/8	-7/8	-2.63
Sperry Rand	21 3/4	15 1/4	6063	16 5/8	15 1/4	15 5/8	-1/4	-1.57
Xerox	119	70	5220	119	99	117 5/8	+19 5/8	+20.03
NYSE COMPUTER STOCK EXCHANGE				82.30	76.65	80.60	+2.36	+0.005
AMERICAN STOCK EXCHANGE								
ANelex	44	24	461	29 5/8	24	27 1/4	-1	-3.54
Clary	7 1/2	5 5/8	125	6 3/8	5 5/8	5 7/8	-3/8	-6.00
Computer Sciences	29 5/8	15 3/4	507	19 1/4	15 3/4	17	-3	-15.00
Potter Instrument	12 1/4	7 3/4	50	9 5/8	8 1/4	8 1/4	-1/4	-2.94
Teleregister Corp.	13 5/8	9 5/8	857	12	10 1/2	10 7/8	-3/8	-3.33
AMEX COMPUTER STOCK AVERAGE				15.38	12.83	13.85	-1.00	-6.16

	1964 High Bid	1964 Low Bid	May 22 Bid	May 22 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	12	13	10 3/8
Computer Control	18 3/8	12 3/4	18 1/8	19 1/4	17 1/2
Data Products	8 1/8	3 5/8	5 1/8	5 5/8	4 1/8
Digitronics	20	9 1/4	9 1/2	10 1/2	10 1/4
Dura Corp.	38	31 3/4	35 3/4	37 7/8	37

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June 15, 1964 Vol. 1, No. 6

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

MOVE OF UNIVAC'S PREXY RADER TO GE SURPRISES INDUSTRY, SPARKS MERGER RUMORS

The resignation, effective July 1, of Dr. Louis T. Rader as president of Univac came as a surprise and shock to the computer industry last week. Dr. Rader has been president of Univac since 1962 and during that time industry observers give him considerable credit for "bootstrapping" Univac to a strengthened hold on second place in the computer market.

Dr. Rader is planning to join GE as Vice President and General Manager of its Industrial Electronics Division. This division includes GE's Computer Department in Phoenix, as well as GE's Industrial Control, Specialty Control, and Instrument Departments. Part of this new job may feel like fitting into an old shoe for he was general manager of GE's Specialty Control Department from 1953 to 1959.

Dr. Rader's move rekindled off-heard rumors about a merger of Univac into GE's Computer Department...and thereby upgrading GE's computer group to divisional status. While this is a possibility, we feel that it is unlikely. The computer product lines of the two groups are competitive in many areas, and in other areas do not form a complementary match. GE is already doing nicely with its 400 family of computers, and is preparing to do some chest-pounding about what looks like a very competitive 600 family of large-scale computers. Only Univac's 1004 would seem to make a significant addition to GE's computer line, or its spectrum of customers. Besides, GE normally requires a division to operate as a profit center, and neither Univac nor GE's computer group is turning up a profit at the current time. Key employees at Univac and GE's Computer Department also tell us privately that they believe such a merger is very unlikely.

The reasons for Dr. Rader's decision to move to GE are at best unclear. Some believe that he felt slighted when another Sperry Rand division president, J. Frank Forester, head of Vickers, Inc., was tapped for a key, yet then vacant, spot on the board of directors of Sperry Rand...losing for Univac a chance to get its needs represented directly in the corporate boardroom. Significantly, Forester has been named as Dr. Rader's successor.

Others suggest that Dr. Rader feels that the most significant area for growth in the computer market is in process control and GE, as a leader in this area, offered him a better opportunity to lead industry

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developments in this area. A third reason suggested for the switch...one that is more or less the "official position" at Univac...is that Dr. Rader over-extended himself in his two years of nearly round-the-clock activity in improving Univac's image and income throughout the world, and he needed a change to a position less in the spotlight, for personal and health reasons.

Whatever the reasons for Dr. Rader's move, Univac is likely to end up the loser. Forester will be the fourth head of Univac in six years... and this lack of management continuity has handicapped coordination between Univac's product planning, development, and sales functions. Consequently there is a remarkable lack of continuity in Univac's product line, and computers such as the 1050 series were late getting into the market, and the well-engineered 1107 was backed by less than adequate software.

Univac does have a generation of integrated circuit computers under development, and according to insiders at Univac, there should be an announcement on it by late fall. Univac also has an improved version of the 1107 ready for announcement, but it will probably delay this release until after Forester has a chance to get his bearings.

NEW BUDS ON GE'S MANAGEMENT TREE

GE itself is going through a round of personnel changes at its Computer Department...with indications that it is mustering together a management team equipped for a big push toward the number two spot in the computer field. Verner S. Cooper was recently named to replace Lacy Goostree as manager of marketing for the entire GE commercial computer line. Goostree will concentrate on expanding the market for the 400 family of computers.

GE's other announced computer family, the 200 line, has a new manager of product sales in James R. McPherson, who replaces P. L. Todd who has left the company.

Three technical groups at GE's Computer Dept., the Advanced Products Operation, Engineering, and Special Projects, have been combined into a new Systems and Processors Operation under Dr. John W. Weil. One dropout: Dr. Robert Johnson, probably GE's top computer designer and former head of the Advanced Products Operation, subsequently resigned to join Burroughs in Detroit.

In sum it appears that GE's top management gave its Computer Dept. a strong "go ahead" directive at the corporation's planning session last November, and the Phoenix-based group is now gearing up for a sustained assault in the computer marketplace with a goal of 10-15% of the market by 1970.

NCR EXPANDS COMPUTER LINE INTO ACCOUNTING SYSTEM FIELD

NCR made a significant move recently to strengthen its position in the electronic accounting system market with the announcement of its

new NCR 395. This desk-size computer has a magnetic disk memory of 120 14-digit words any of which can be randomly accessed in approximately 35 msec.

The 395 serves to bridge the gap between NCR's "Compu-Tronic" electronic accounting machine and its 390 computer. Price range for the 395 is from $17,700 to $25,775 (monthly rental $460 to $690), compared with $62,775 for a typical 390 system.

The 395 seems directly competitive to Burroughs' recent announced E2100 direct accounting computer...which has generated more than $16,000,000 in sales for Burroughs since its announcement. Friden's 6010 computer, with its recently announced magnetic disc file memory and its $75 per month automatic card reader, should also receive competitive pressure from the 395.

IBM offers comparatively limited competition to NCR in the 395 area, mostly through the IBM 6400 magnetic ledger card accounting system. An indication that IBM does not conceive of serving this market with a computer product is that the 6400 is sold by the Accounting Machine Department of IBM's Electric Typewriter Division. IBM began installing 6400's last October, and to date has installed slightly over 600 machines in the United States. Orders for the 6400 are currently estimated at 1100.

The development of the accounting machine market has been interesting to watch. At first, the accounting machines were totally mechanical in operation, and thus relatively slow, costly, and of uncertain reliability. The next generation (if we can use that term!) emerged as electro-mechanical devices offering much improved all-round performance. However, as more and more firms in NCR's retail and banking markets called for accounting systems which handled information in ways compatible with computers and electronic data processing systems, the all-electronic generation of accounting machines was developed and is now reaching the market. The unexpectedly large success of the E2100 (insiders at Burroughs say they had expected to sell about $4 million in E2100's by the time they had actually sold $15 million) indicates that there is a considerable untapped market for accounting computers like the 395. One of the necessary features for a successful small computer for business application is low cost punched card reading, and NCR's 382 card reader (rents for only $50 per month) appears to be an effective solution to this requirement.

NCR is expected to expand and supplement its aging 390 computer this fall with the introduction of the NCR 590 computer. The 390 can be expected to remain active in NCR's line, though reduction in rental prices can be expected. The 590 will have ledger card maintenance capability, but will also feature a wide range of peripheral devices including a 2000 card per minute reader, and magnetic tape transports, both made by NCR. Previously, nearly all tape transports used by NCR were purchased from Ampex. While the 390 can handle only a limited amount of alphabetic data, the 590 will have an expandable core memory which offers virtually unlimited alpha-numeric data handling capabilities. Price range will be approximately $1900 per month.

NCR's prosperity in the long range in the data processing area seems reasonably assured, for its marketing force is restricting its activities to its traditional area of competence: data processing for retailing and banking applications.

CONTROL DATA CONTINUES TO EXPAND PERIPHERAL LINE

Could a quote in the June 15th issue of Forbes Magazine be an indication that the legendary management efficiency at Control Data is beginning to evidence some decay? Forbes quotes a CD executive who moans over the problem of motivating some of their top executives who now own company stock valued at over $40 million by saying, "You can't imagine the problems of trying to manage an independently wealthy millionaire."

Control Data has, however, taken another stride toward developing a completely owned capability in computer peripheral equipment by reaching agreement recently with Holley Carburetor Company to acquire all of the latter's common stock of Holley Computer Products Co. in return for an undisclosed amount of Control Data stock. Holley and Control Data have each owned 50% of the outstanding stock of Holley Computer Products since May, 1962.

Located in Warren, Michigan, Holley Computer Products makes medium-speed drum printers that operate at 150-300 lines per minute as well as a 16 column lister. Control Data currently employs Holley printers with its smaller computer systems, as well as in its record transmission and information control systems.

As a result of the acquisition, R&D activities in Holley Computer Products will be coordinated with Control Data's Peripheral Group, which designs and manufactures the firm's magnetic tape handlers, card readers and punches, high-speed printers, and document optical readers.

This acquisition, coupled with the announcement last week of a medium speed 601 magnetic tape transport, a unit which provides transfer rates of 7500 and 20,850 per month at bit densities of 200 and 556 bits/inch, brings Control Data rather close to providing a comprehensive line of its own peripheral devices for medium to large scale users of EDP systems. Still missing from the mix are large capacity random access devices, such as a disc file bulk core storage, magnetic card systems, etc. Control Data has negotiated with management people at the two leading suppliers of disc files, Bryant Computer Products and Data Products Corp., without being able to reach an agreement on terms for acquisition of at least the disc file groups at these two firms. Control Data is apparently now putting its bulk random access storage hopes in large ferrite arrays it is developing. These units are rumored to be in the 3-5 million character range with access times of about 5 usec.

ANELEX: WHITHER WENT THE PRINTER MARKET?

As the above story indicates, computer manufacturers are making aggressive moves toward developing their own ability to build and supply peripheral equipment for their systems. This trend suggests evil days ahead for firms such as Anelex whose sales activity has been largely confided to providing high-speed printers for firms such as RCA, General Electric and, up to the present, Control Data. With Control Data fulfilling most of its printer requirements itself, and with General Electric developing a high-speed printer of its own for announcement in

the fall, RCA apparently will be the only major computer builder who will be dependent on Anelex printers for its EDP systems. Among the smaller firms in the field, such as SDS, DEC, 3C, etc., Anelex has been facing increasing competition from a capable new medium speed printer from Data Products Corp. Also, Potter Instrument has developed a high-speed printer with point plotting capability which should capture special interest in many scientific applications, further limiting Anelex's share of a shrinking printer market.

Anelex has been able to report sales for the first half of fiscal 1964 of $9,074,563, a substantial increase over sales of $6,472,901 for the same period in 1963. However, a large part of this gain came from increased sales in Europe where Anelex has been supplying the printer requirements for such large customers as I.C.T. and Elliott Automation in England, and Bull in France. Bull is Anelex's largest European customer for printers, and recent moves by GE to obtain a substantial financial interest in Bull may well indicate a sharp decline in Anelex's sales to Bull during the next year.

As though in an effort to face this problem, Anelex is spending slightly over $1 million this year in R&D on a family of magnetic disc file storage units. Its Model 800 large capacity units and Model 80 portable disc pack units will be in production for the first time late this year. The performance specifications we have seen on these units are not significantly superior to other random access memory units which are already on the market, or expected to be available at the same time, so it is difficult to see how Anelex will be able to achieve a satisfactory product life for its products in an area which is already quite competitive. Also, disc files will be especially vulnerable to expected technical advances in fabricating large capacity photo-optical, thermoplastic, or ferrite memory planes which will offer storage capacity and cost similar to disc files, but at greatly reduced information access times.

DIEBOLD SELECTS IBM FOR SBT AWARD

The award of a highly sought-after contract for a real-time data center for the Savings Banks Trust Company in New York City has been made to IBM. The selection of the supplier for the estimated $13 million contract was made by The Diebold Group. It is probable that the recommendation will be accepted by the Savings Banks Trust Company and that The Diebold Group will oversea the implementation of the system.

Five manufacturers proposed equipment for the system...two of them planning to use Teleregister window machines. Burroughs proposed to use one B270 and six B280's. RCA proposed jointly with Teleregister a conglomeration of 301 computers, Teleregister window machines, Burroughs disc files and IBM punched card equipment. UNIVAC proposed to use two 490's with Teleregister window machines. NCR proposed the services of a real-time data service center which it plans to set up in New York regardless of the outcome of the SBT selection. IBM's winning proposal included two 7740's and two 1401's.

As expected, a number of the bidders are disgruntled by the selection. To date, only three U.S. Savings Banks have on-line systems...all developed by Teleregister...whose equipment figured in the proposals by

RCA and UNIVAC. The only sure winner in the race was The New York Telephone Company which will provide the leased lines connecting the participating banks with the data center.

The Savings Banks Trust Company is controlled by 126 member banks in New York State.

EUROPEAN COMPUTER MARKET

The fiscal dangers of the huge investment required to develop a computer series and to build up a collection of installations on a rental basis has been vividly portrayed to European industrial leaders. Each of the three largest European manufacturers of computers has run into financial trouble while trying to battle IBM for a share of the European computer market. First, Compagnie des Machines Bull in France ran into a severe cash shortage. Ing. C. Olivetti & Co. in Italy developed the same affliction shortly thereafter. The last member of the group, I.C.T. in England, is apparently experiencing the same symptoms, largely due to the unwieldy set of computer products resulting from the recent merger of the computer divisions of EMI, Ltd. and Ferranti, Ltd. in I.C.T.

Despite the hardships of its three main indigenous suppliers, the European computer market continues to grow handsomely, thanks to the willingness of American suppliers to respond to market demands. A recent study of the number of computers installed and on order in each country in Europe was made by one of England's leading consultants in the field, Computer Consultants Ltd. of Cecil Court, London Road, ENFIELD, Middlesex. The results of their study are summarized below:

COMPUTERS IN EUROPE

Installed to end of 1963	3,919
Orders for installations in 1964	2,184
Estimated installations for 1965	2,916
Estimated installations for 1966/1970	18,402
	27,421

	COMPUTERS INSTALLED		COMPUTERS ON ORDER	
COUNTRY	NUMBER (END OF 1963)	VALUE (END OF 1963) ($MILLIONS)	NUMBER (END OF 1963)	VALUE (END OF 1963) ($MILLIONS)
Austria	66	16.1	50	12.3
Belgium	142	36.2	105	29.7
Denmark	74	17.2	30	10.5
Finland	19	4.1	35	9.5
France	791	136.0	406	69.6
Germany	993	131.2	455	58.1
Great Britain	626	81.1	381	57.2
Greece	50	15.1	20	5.4
Irish Republic	10	2.3	39	6.3
Italy	592	159.1	339	63.9
Netherlands	156	42.3	134	44.2

COUNTRY	COMPUTERS INSTALLED NUMBER (END OF 1963)	COMPUTERS INSTALLED VALUE (END OF 1963) ($MILLIONS)	COMPUTERS ON ORDER NUMBER (END OF 1963)	COMPUTERS ON ORDER VALUE (END OF 1963) ($MILLIONS)
Norway	54	14.8	71	14.7
Portugal	16	5.9	29	8.5
Spain	23	5.9	19	5.2
Sweden	147	42.0	121	31.7
Switzerland	160	56.7	101	39.8
TOTALS	3,919	766.0	2,335	466.7

MANUFACTURE OF COMPUTERS IN EUROPE

COUNTRY OF MANUFACTURE	COMPUTERS INSTALLED VALUE IN $MILLIONS	COMPUTERS INSTALLED TOTAL NUMBER BUILT	COMPUTERS ON ORDER VALUE IN $MILLIONS	COMPUTERS ON ORDER TOTAL NUMBER ON ORDER
Germany	475	1,612	308	1,417
France	300	820	130	352
U.S.A.	188	692	112	166
Great Britain	132	558	98	248
Italy	29	93	27	77
Holland	18	114	9	63
Sweden	5	13	3	12
Denmark	2	17	---	---
TOTALS	1,149	3,919	687	2,335

SIGNIFICANT NEW COMPUTER ORDERS

Company	Address	Computer On Order	Expected Installation Date
American Fletcher National Bank & Trust Co.	Indianapolis, Ind.	IBM 1460	January, 1965
Associated Merchandising Corp.	New York, N.Y.	IBM 1410	November, 1964
Dartmouth College	Hanover, N.H.	GE 235	September, 1964
Donnelley, Reuben H., Corp.	New York, N.Y.	RCA 501	October, 1964
First National Bank of Jersey City	Jersey City, N.J.	IBM 1460	October, 1964
First Union National Bank	Charlotte, N.C.	GE 225	October, 1964
Ford Motor Company	Dearborn, Mich.	IBM 1460	October, 1964
General Electric	Philadelphia, Penn.	GE 235	January, 1965
General Motors Corp., Frigidaire Div.	Dayton, Ohio	IBM 1460	November, 1964
Giannini Control Corp.	Old Saybrook, Conn.	IBM 1460	January, 1965
Goodrich, B. F., Footwear Co.	Watertown, Mass.	RCA 3301	October, 1964
Great American Insurance Co.	New York, N.Y.	IBM 1460	November, 1964
Industrial National Bank of Rhode Island	North Scituate, R.I.	GE 425	November, 1964
Jones & Lauchlin	Cleveland, Ohio	IBM 1460	October, 1964
Midwestern Financial Corp.	Denver, Colorado	H-400	November, 1964
University of Arkansas	Fayetteville, Ark.	IBM 7040	October, 1964
Wayne State University	Detroit, Mich.	IBM 7090	October, 1964
Wyandotte Chemicals	Wyandotte, Mich.	IBM 1460	October, 1964
Xerox Corp.	Rochester, N.Y.	IBM 7010	October, 1964
Zenith Radio Corp.	Chicago, Ill.	IBM 1410	October, 1964

STOCK MARKET REPORT ON SELECTED EDP FIRMS

May 25 - June 12, 1964

	High	Low	3 weeks Sales In 100s	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	67 7/8	40 3/8	1056	45 3/8	40 3/8	43 3/4	-1	-2.23
American R & D	27	18 1/4	174	21	18 1/4	20	-3/4	-3.61
Burroughs	25 3/8	22 1/8	1217	23 1/2	22 1/8	22 1/4	+1/8	+0.57
Control Data	111 7/8	74 1/4	3668	111 7/8	95 1/2	102 3/8	-1	-0.97
Electronic Associates (new)	27 3/8	22 1/8	525	27	22 1/8	22 5/8	-5 1/4	-18.83
General Dynamics	31 5/8	23 1/2	1616	27 5/8	24 5/8	27 1/2	+3	+12.24
General Electric	90 5/8	78 7/8	2582	82 5/8	78 7/8	80	-2 3/4	-3.32
General Precision	32 3/8	25 1/2	351	27 3/8	25 1/2	27	+1/8	+0.47
Honeywell	148 3/4	115 1/4	921	138 3/4	126 1/2	133 1/2	-5 1/2	-3.96
IBM	494	458 3/4	1164	492	461	472 1/2	-18 1/2	-3.77
Inter. Tel. & Tel.	60	52 5/8	666	57	54	54 3/4	-2	-3.52
Litton Industries	79 5/8	58 1/4	1386	63 3/4	58 1/4	59 3/8	-4 1/4	-6.68
Nat. Cash Register	79 3/4	63	745	68 3/4	63	68 1/4	+1	+1.49
Packard Bell	15 1/2	7 7/8	120	9 3/8	8 1/4	8 1/4	-1	-10.81
RCA	39 1/4	30	7406	32 5/8	30	31 5/8	-3/4	-2.32
Sperry Rand	21 3/4	14 5/8	8155	16 3/4	14 5/8	14 3/4	-7/8	-5.60
Xerox	120 5/8	70	6165	120 5/8	105 1/4	116 1/4	-1 3/8	-1.17
NYSE COMPUTER STOCK EXCHANGE							-2.40	-3.06
AMERICAN STOCK EXCHANGE								
ANelex	44	23 3/4	148	28	23 3/4	24 7/8	-2 3/8	-8.72
Clary	7 1/2	5 5/8	110	6 1/8	5 3/4	5 3/4	-1/8	-2.13
Computer Sciences	29 5/8	15 3/8	206	18	15 3/8	16 3/8	-5/8	-3.68
Potter Instrument	12 1/4	7 5/8	97	8 1/2	7 5/8	8 1/8	-1/8	-1.52
Teleregister Corp.	13 5/8	7 5/8	640	12	10 3/8	10 5/8	-1/4	-2.30
AMEX COMPUTER STOCK AVERAGE							-0.70	-3.67

	1964 High Bid	1964 Low Bid	June 12 Bid	June 12 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	12 1/8	13 1/8	12
Computer Control	19 1/8	12 3/4	18 1/2	19 3/8	18 1/8
Data Products	8 1/8	3 5/8	4 3/8	4 7/8	5 1/8
Digitronics	20	9 1/4	11 1/2	12 5/8	9 1/2
Dura Corp.	28 1/2	23 7/8	25 1/2	27 1/4	26 1/2*

*2 weeks ago

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

SEVERAL FIRMS PLAN TO COMPETE WITH CONTROL DATA FOR SUPER-SCALE COMPUTER TITLE

The face of IBM Chairman Thomas Watson, Jr. flushed slightly when a stockholder put the question directly at the recent Annual Meeting: "Does the Control Data 6600 system stand alone as the world's most powerful computer?" After a pause, Chairman Watson replied, "I think it fair to say that viewed from certain aspects - such as the kinds of equipment about to be installed or already working for a customer - the 6600 is, at the moment, the fastest computer."

Watson clearly wished the answer was otherwise...and he is hoping the answer will change by 1967. As the leading manufacturer of computers, IBM realizes the publicity and prestige associated with being the designer and builder of the "world's fastest computer". They invested millions of dollars of their own funds in Project STRETCH during the late '50's in an attempt to gain continuing possession of the title "maker of the world's fastest computer". However STRETCH fell far short of original performance specifications, and production was terminated on the computer after only a handful of installations.

IBM's current entry in the "most powerful computer-to-be" competition is the model 90 of the System/360. This computer offers a 64-bit word length with 64K words of internal core memory (512K characters). Speeds range up in the three million additions/sec., one million floating point multiplications/sec. area...about twice as fast as the model 70. Cost of the model 90 with a half million words of 8usec. bulk core storage is about $4.5 million. In a typical configuration with the model 50 as a satellite processor, costs are in the area of $7 million. Delivery date on the model 90 is currently quoted as the summer, 1967. The only bulk storage devices currently being quoted on the model 90 are those already announced for the System/360 line...the 2361 bulk core storage unit, the 2321 data cell, and an assortment of magnetic disks and drums.

Control Data is not unmindful of the competition from the model 90. They have already lowered the lease cost on the 6600 by 40% (see Control Data comment this issue), and have designed a new computer the 6800, reputed to be four to five times faster than the 6600. CDC is currently proposing this machine to several AEC installations and is hoping to acquire a contract to build the first unit by this fall.

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One of the problems CDC faces with their ultra-large computer program is that it appears to be singularly dependent on their engineering genius, V-P Seymour Cray. Cray is doing the pioneering design work on both the hardware and software for the 6000 family and many people feel that only he understands the full complexities of the system well enough to complete the job. At least one prominent prospect for a 6600 has expressed to us his reluctance to order a $4-6 million computer that is dependent on one man for the completion of key parts of the system. Should anything happen to Cray, they feel, Control Data is unlikely to be able to deliver on schedule and/or to specifications.

Other computer builders are also competing for contracts for development of ultra-large computer systems. Burroughs has been proposing a 9000 computer to several large installations. This unit is an extension of the firm's B5000 computer into the $70,000 per month range with an eight-to-ten times increase in processing power. Philco has been proposing an extension of their 2000 line, believed to be called the 2000-214, and leasing in the $90,000 per month range. Both machines are believed to operate in the two to three million operations per second range, with a heavy emphasis on multiprocessing capability (executing several instructions simultaneously).

The market for ultra-fast computers has in the past been limited to scientific research institutes doing calculations for nuclear research or weather forecasting, and to the military for command and control systems. The demands of both problem areas require greatly increased fast-access storage capacity as well as greater computing power. The first demand will probably be met in the next eighteen months by the developments of photo-optical memories, ultra-fast magnetic drums, and continuous plane ferrite or thin-film memories. The second demand is not likely to be met by computers with an internal organization similar to those in the field today. The solution of complex problems in areas such as nuclear research and weather forecasting requires the solution of systems of ordinary and partial differential equations. These technical areas possess a common mathematical characteristic, the calculation of a matrix of numerical values...values which can be determined by mutually independent calculations within the computer. A computer with a highly parallel computing structure, where these values can be determined by simultaneous and independent computing operations, could solve such problems much more quickly than possible today.

The firm which has done the pioneering work in designing a computer to operate in such a highly parallel fashion is Westinghouse, whose SOLOMON (Simultaneous Operation Linked Ordinal Modular Network) computer provides such a network of mutually independent memories and computing elements. However, it is unlikely that Westinghouse will venture into the computer manufacturing area with this computer. Mindful of the experiences of IBM on STRETCH, UNIVAC on LARC and the delays on the delivery of the CDC 6600, Westinghouse realizes that the development of a super-scale computer is a very costly and speculative operation. Various AEC installations are interested in sponsoring the development of a SOLOMON type of computer, however. Indeed, the Lawrence Radiation Laboratory at Livermore, Calif. is holding technical briefings this summer with selected computer builders to invite bids for this purpose. Cost range for such a computer development is expected to be in the neighborhood of $9 million. The initial contract for a SOLOMON type computer development may be awarded this fall. The selected contractor will probably be able to lay claim to "the maker of the most powerful computer-to-be" title from that point on.

CONTROL DATA CUTS PRICES, ACHIEVES RECORD BACKLOG

Control Data's recent price cuts of 5% to 15% on their 3000 family of computers, and a 40% reduction on the rental price of their super-scale 6600 computer, have reaped a healthy increment in new orders during this past month. President William Norris' words were: "During June, the Company received new orders for equipment worth over $61 million, and these are all firm orders exclusive of Letters of Intent."

This $61 million order rise brings Control Data's backlog to an all-time high...probably in the neighborhood of $210 million. Several factors aided this sales spurt. One was that it takes about two months for a customer to analyze the merits of a new computer system and determine if it is their "best buy". It has been just over two months since IBM's System/360 was announced and apparently many Control Data prospects concluded from their evaluation of the new IBM line that Control Data had competitive equipment on a more favorable delivery schedule...the 3200 and 3600 now enjoy a six months delivery cycle...the 3400 will start deliveries in October...the 3300 and 3800 will start deliveries in mid-1965. Deliveries on the larger models in the System/360 line are not scheduled to begin until late 1965.

The price reductions served as the added trigger in disgorging the flow of new computer orders to Control Data. An example of this is the decision of the National Center for Atmospheric Research in Bolder, Colo., to place an order for the huge 6600 computer when Control Data dropped the rental price on the proposed system from $125,000 per month to $76,000 per month.

According to insiders at Control Data the soon-to-be-announced 3800 and 3300 computers will virtually terminate the market life of the 3600 and 3200 computers respectively. Each new machine will offer about twice the computing power of the next lowest member of the line for only $1000-$3000 per month more in rental costs. One of the unpleasant consequences of this fact for Control Data is that users who will have a 3600 or 3200 computer on a rental basis in mid-1965 will probably request replacement of their equipment with the newer computers. The new computers are program compatible with the current models, so reprogramming is not an important obstacle to such replacement. However, the oldest 3600's have been installed for just over two years...and we estimate that there will be about 25 3600's on a rental basis when the 3800 is ready for delivery. The 3200 has just begun installations...six are now installed outside of Control Data...and probably about 50 will be installed on a rental basis when the 3300 is ready for delivery. This obsolescence within the 3000 computer family may prove quite costly to Control Data unless they are able to continue to significantly increase the ordering rate for the newer members of their 3000 series: the low cost 3100, the 3300 and the 3800.

Continuing their plan to grow by acquisition, Control Data completed negotiations for the absorption of Adcom Corp., Chatsworth, Calif. The agreement, subject to the approval of Adcom stockholders, gives Control Data all of Adcom's stock in return for an undisclosed amount of CDC's stock. Adcom manufactures a line of high-speed analog conversion equipment found in data acquisition equipment used in bio-medical research, simulation, dynamic testing and hybrid computing systems. The acquisition offers CDC an extension of their capability in developing complete systems for manufacturing and process control applications.

NCR INTRODUCES THIN-FILM STORAGE COMPUTER, HAS 10% SALES INCREASE IN HALF

NCR is not usually among the first names to come to mind when one considers the firms who are leading the development of computer technology. However just over three years ago they demonstrated this opinion might well be deficient when they announced their CRAM magnetic card memory system... a device which offered one of the first economic solutions to the fast access, large storage capacity problem. NCR has reaffirmed this high technical performance in memory systems by announcing its 315 RMC (Rod Memory Computer) which uses a main memory made entirely of thin-film storage elements...the first such commercially available...to increase the operating speed of its 315 computer by a factor of eight while increasing its rental cost by only 15%.

The main memory of the new computer is fabricated from cylindrical thin-film, rod-like magnetic storage elements rather than the conventional ferrite cores. The basic storage unit is a hair-like beryllium-copper wire which is electroplated with a magnetic film. These wires are assembled into a three-dimensional array to form the completed memory. In the computer, electrical pulses sent through tiny coils in the memory stack magnetize the film in predetermined directions and at specific locations, thereby storing information. The basic cycle time of the 315 RMC memory is .8 μsec. compared with 6 μsec for the core memory of the currently installed 315.

The improved version of the 315 computer will be available for installation beginning in mid-1965. At that time the users of an estimated 230 315 computers which will be installed by then can request that their processor be replaced by the 315 RMC. The 315 RMC can use current 315 programs and peripherals without modification.

NCR has also just introduced a new line of higher performance peripherals which will be available with the 315 RMC. These include a 120 kc magnetic tape handler, a 1000-line-a-minute printer, a 250-card-a-minute card punch, and a data communications control work for expanded on-line processing capability. The latter unit will be able to control up to 100 remote I/O devices hooked up on-line with any 315 processor... an important introduction in light of the extensive on-line data processing seen for banks and retail stores. An indication of this is that NCR currently has computer-controlled on-line systems operating in four savings banks in New York State alone.

NCR has another first to report at Pittsburgh's Joseph Horne Co.'s department store. This store is processing over 80% of its transactions by use of an optical-print sales register and an NCR 315. The registers automatically print each transaction in stylized figures on a sales journal tape. These tapes are read by an optical reader directly into the 315 computer completing a day's business data in $3\frac{1}{2}$ hours. Horne's system is presently processing information on more than 700 classes of items in 200 different departments for six store locations. This combination of legible recording of transactions, with automatic input to the data processing systems, appears to offer both clerical savings and increased efficiency. If this pioneering installation fulfills its promise, many additional retail stores are expected to follow its lead in the near future.

NCR Chairman Robert S. Oelman added an additional bright spot in the NCR picture when he mentioned in an interview that his company had a 10% increase in sales and in earnings for the first half of 1964. This indicates sales in the neighborhood of $97 million for the first half, and a profit of $8.5 million for the same period. Mr. Oelman also added that incoming equipment orders were also running approximately 10% ahead of last year.

GE'S VAN AKEN PREDICTS FEW WILL STAY IN COMPUTER BUSINESS

Harrison Van Aken, General Manager of GE's Computer Department, predicted to us last week that by 1970 only four U. S. manufacturers would be supplying complete computer systems. This projection shaves two finishers off the oft-quoted figure of six finishers in the 1970 computer market made by Control Data's William Norris last summer.

Mr. Van Aken declined to mention by name who he thought would be around in the computer business at the start of the next decade, but his recent announcement that GE will increase its computer manufacturing facility in Phoenix by 50%, and also increase by 50% its field sales force within the next six to nine months, indicates that he feels confident GE will be among his predicted quartet. Van Aken said that the Phoenix plant will eventually become the center for product planning, development, and production of equipment and systems to serve GE's computer markets. He predicted that continued growth in the future will make it necessary for GE to establish additional plants in other parts of the country to serve its computer activities. Our current expectations are that the peripheral equipment operation currently based in Phoenix will be moved to a location in the Midwest before 1966.

HONEYWELL ANNOUNCES EXPANSION OF 200 FAMILY

Honeywell made its predicted expansion of its 200 computer family with the recent introduction of the H-2200 medium-scale computer system (average monthly rental is $10,000). The main memory of the H-2200 is expandable from 16K to 131K characters. The cycle time is one usec. for main memory, and .25 usec. for the control memory.

Continuing its "Liberator" concept of the automatic program translation of programs written for character-mode IBM computers, Honeywell announced that the H-2200 will include program translators for the IBM 1410 and 7010, as well as the 1401, 1440 and 1460 machines.

At the same time, Honeywell reduced the minimum monthly rental of its popular H-200 computer by 15%, to $2380 monthly, by producing an 800 card-per-minute reader of their own manufacture. This is the first card handling equipment that Honeywell has manufactured...one can expect that Honeywell will be introducing its own card punch within the next year (they currently buy card punches from IBM). Other peripherals introduced include 19 new communication units which offer price reductions over previous models. Rentals range from $150 a month for a single telegraph- or voice-line unit to $2,150 a month for 38-telegraph-line and two-voice-unit lines.

First reactions to the H-2200 indicate that it will stimulate more sales for the H-200 than it will be able to achieve for itself for some time. The official introduction of the H-2200 is likely to assure H-200 prospects that Honeywell will offer them a family of upward compatible computers to handle their increasing load of data processing problems.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF JUNE 29, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	16	7
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	20	2
	ASI 2100	Y	$3000	12/63	5	2
Autonetics	RECOMP II	Y	$2495	11/58	66	X
	RECOMP III	Y	$1495	6/61	17	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	11	3
	RW-300	Y	$5000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$7000	12/63	5	15
	TRW-530	Y	$6000	8/61	22	4
Burroughs	205	N	$4600	1/54	63	X
	220	N	$14,000	10/58	43	X
	E101-103	N	$875	1/56	128	X
	E2100	Y	$535	8/64	0	635
	B100	Y	$2800	9/64	0	29
	B250	Y	$4200	11/61	72	18
	B260	Y	$3750	11/62	58	30
	B270	Y	$7000	7/62	75	38
	B280	Y	$6500	7/62	88	48
	B370	Y	$8400	7/65	0	12
	B5000	Y	$16,200	3/63	33	25
Clary	DE-60/DE-60M	Y	$525	2/60	216	5
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	26	25
	DDP-224	Y	$3300	12/64	0	5
Control Data Corporation	G-15	N	$1000	7/55	321	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/ 160G	Y	$1750/$3000/$4800	5/60, 7/61,3/64	376	25
	924/924A	Y	$11,000	8/61	26	5
	1604/1604A	Y	$35,000	1/60	60	1
	3600	Y	$52,000	6/63	20	30
	3400	Y	$32,000	11/64	0	18
	3200	Y	$9000	5/64	6	65
	6600	Y	$150,000	6/64	1	3
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	52	4
	PDP-4	Y	Sold only about $60,000	8/62	38	14
	PDP-5	Y	Sold only about $25,000	9/63	38	40
	PDP-6	Y	Sold only about $300,000	8/64	0	4
	PDP-7	Y	Sold only about $72,000	10/64	0	2
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	Sold only about $20,000	6/63	137	96
General Electric	205	Y	$2900	9/64	0	11
	210	Y	$16,000	7/59	73	X
	215	Y	$5500	11/63	20	3
	225	Y	$7000	1/61	165	2
	235	Y	$10,900	12/63	11	13
	415	Y	$5500	5/64	2	98
	425	Y	$7500	7/64	0	40
	435	Y	$12,000	10/64	0	21
	455	Y	$18,000	6/65	0	11
	465	Y	$24,000	6/65	0	6

MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATION	NUMBER OF UNFILLED ORDERS
General Precision	LGP-21	Y	$725	12/62	115	59
	LGP-30	semi	$1300	9/56	440	5
	RPC-4000	Y	$1875	1/61	101	2
Honeywell Electronic Data Processing	H-200	Y	$4200	3/64	13	610
	H-300	Y	$3900	7/65	0	10
	H-400	Y	$5000	12/61	98	11
	H-800	Y	$22,000	12/60	62	2
	H-1400	Y	$14,000	1/64	7	8
	H-1800	Y	$30,000	1/64	3	6
	H-2200	Y	$11,000	10/65	0	1
	DATAmatic 1000	N	---	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3600	12/57	535	X
	360/30	Y	$4200	7/65	0	650
	360/40	Y	$9600	7/65	0	280
	360/50	Y	$18,000	9/65	0	200
	360/60	Y	$35,000	10/65	0	100
	360/62	Y	$50,000	11/65	0	22
	360/70	Y	$80,000	10/65	0	110
	650-card	N	$4000	11/54	400	X
	650-RAMAC	N	$9000	11/54	80	X
	1401	Y	$4500	9/60	7100	900
	1401-G	Y	$1900	5/64	90	850
	1410	Y	$12,000	11/61	315	160
	1440	Y	$1800	4/63	940	1100
	1460	Y	$9800	10/63	300	620
	1620	Y	$2000	9/60	1490	40
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	40	45
	702	N	$6900	2/55	2	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	43	X
	7040	Y	$14,000	6/63	45	48
	7044	Y	$26,000	6/63	35	18
	705	N	$30,000	11/55	86	X
	7070, 2, 4	Y	$24,000	3/60	490	55
	7080	Y	$55,000	8/61	69	8
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	55	4
	7094	Y	$70,000	9/62	250	25
	7094 II	Y	$76,000	4/64	33	80
ITT	7300ADX	Y	$18,000	7/62	8	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5300	3/58	158	X
	Monrobot XI	Y	$700	12/60	388	175
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	180	100
	NCR - 390	Y	$1850	5/61	595	170
	NCR - 395	Y	$650	5/64	20	120
Packard Bell	PB 250	Y	$1200	12/60	155	18
	PB 440	Y	$3500	3/64	2	8
Philco	1000	Y	$7010	6/63	16	7
	2000-212	Y	$52,000	1/63	6	5
	-210, 211	Y	$40,000	10/58	19	4
Radio Corp. of America	Bizmac	N		-/56	4	X
	RCA 301	Y	$6000	2/61	475	145
	RCA 3301	Y	$20,000	7/64	0	20
	RCA 501	Y	$25,000	6/59	93	4
	RCA 601	Y	$35,000	11/62	4	1
Scientific Data Systems Inc.	SDS-92	Y	$900	12/64	0	1
	SDS-910	Y	$2000	8/62	72	35
	SDS-920	Y	$2700	9/62	55	10
	SDS-925	Y	$2500	12/64	0	0
	SDS-930	Y	$4000	6/64	2	13
	SDS-9300	Y	$7000	10/64	0	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	33	X
	Solid-State II	Y	$8500	9/62	41	4
	III	Y	$20,000	8/62	70	50
	File Computers	N	$15,000	8/56	40	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	342	1
	418	Y	$11,000	6/63	6	7
	490	Y	$26,000	12/61	33	21
	1004	Y	$1900	2/63	1400	950
	1050	Y	$8000	9/63	52	260
	1100 Series (except 1107)	N	$35,000	12/50	15	X
	1107	Y	$45,000	10/62	18	13
	LARC	Y	$135,000	5/60	2	X
				TOTALS	20,072	9599

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

June 15 - June 26, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	905	46 7/8	43 1/2	45 5/8	+1 7/8	+4.29
American R & D	27	18 1/4	136	22 5/8	19 1/2	22 5/8	+2 5/8	+13.13
Burroughs	25 3/8	22 1/8	1494	25 1/4	22 1/8	24	+1 3/4	+7.87
Control Data	111 7/8	74 1/4	3330	109 1/2	97 3/4	97 3/4	-4 5/8	-4.52
Electronic Associates	27 3/8	22 1/8	470	25 3/8	22 1/2	25 1/8	+2 1/2	+11.05
General Dynamics	31 5/8	23 1/2	882	28 3/8	27 1/8	27 1/2	-----	-----
General Electric	90 5/8	78 1/4	1817	80 3/8	78 3/4	79	-1	-1.25
General Precision	32 3/8	25 1/2	307	28 7/8	26 3/4	26 7/8	-1/8	-0.46
Honeywell	148 3/4	115 1/4	653	138	131 3/4	137 3/8	+3 7/8	+2.90
IBM	494	458 3/4	598	483 1/2	473 1/2	478	+5 1/2	+1.16
Inter. Tel. & Tel.	60	52 5/8	552	57	54 1/8	57	+2 1/4	+4.11
Litton Industries	79 5/8	58 1/4	880	65 3/8	59 1/2	64 3/8	+5	+8.42
Nat. Cash Register	79 3/4	63	527	69 7/8	67 1/4	69 1/4	+1	+1.47
Packard Bell	15 1/2	7 7/8	161	8 3/8	7 7/8	8 3/8	+1/8	+1.52
RCA	39 1/4	30	5271	34	31 5/8	32 7/8	+1 1/4	+3.95
Sperry Rand	21 3/4	14 5/8	2481	15 5/8	14 5/8	14 3/4	-----	-----
Xerox	122 3/8	70	3510	122 3/8	109	116 3/8	+1/8	+0.11
NYSE COMPUTER STOCK EXCHANGE							+1.31	+3.16
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	136	25 1/2	22 7/8	25 3/8	+1/2	+2.01
Clary	7 1/2	5 1/4	84	5 3/4	5 1/4	5 1/2	-1/4	-4.35
Computer Sciences	29 5/8	15 3/8	166	20 1/8	15 3/4	19 1/2	+3 1/8	+19.08
Potter Instrument	12 1/4	7 5/8	38	8 1/4	7 3/4	7 3/4	-3/8	-4.61
Teleregister Corp.	13 5/8	7 5/8	466	11 5/8	9 7/8	10 1/4	-3/8	-3.53
AMEX COMPUTER STOCK AVERAGE							+0.53	+1.72

	1964 High Bid	1964 Low Bid	June 26 Bid	June 26 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	13 1/8	14 1/8	12 1/8
Computer Control	19 5/8	12 3/4	19	20 1/4	18 1/2
Data Products	8 1/8	3 5/8	4	4 1/2	4 3/8
Digitronics	20	9 1/4	10 1/2	11 1/2	11 1/2
Dura Corp.	28 1/2	23 7/8	26 1/2	28 1/4	25 1/2

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

GENERAL ELECTRIC OBTAINS ADVANCED POSITION IN COMPUTER TIME-SHARING FIELD BY WINNING MIT PROJECT MAC AWARD

GE's computer department received several days ago what is probably its most significant new computer order since it landed the original ERMA contract from the Bank of America back in 1956. The order, from MIT's Project MAC calls for a modified version of GE's new 635 computer... the upper end of GE's newly introduced Compatibles-600 line. The leasing price of the GE computer at MAC will be about $100,000 per month.

The Project MAC award comes as an important breakthrough for GE into one of the most important new developments in the application of computers... multi-station access to a computer on a simultaneous basis by "time sharing" of the central processor. This technique is expected to increase significantly the number of people who can receive substantial problem-solving aid from a single computer system and also reduce significantly the time between when a problem is first conceived and when the computer begins to process it.

To date there are only a handful of time-sharing projects in the United States...the most carefully watched of which is Project MAC. However the results from these projects are encouraging enough to cause many experts to speculate that within five years a substantial part of scientific and engineering computation will be done by time-shared computer systems with individual technical people presenting their own problems to a computer via a console located at their work station.

The selection of the modified 635 indicates that the MIT group has determined that the new GE equipment is currently their "best buy" in computer hardware for time-sharing systems. The MAC group considered proposals from most of the major computer builders in making their choice. Significantly, IBM's offering of a multi-computer configuration of a System/360 model 50 was by-passed even though MIT has had a close relationship with IBM since the first 650 computers were installed at the Institute over ten years ago...in fact, GE's equipment will replace a 7094 currently being used for Project MAC work. Both the delivery date of the System/360 as well as its systems design worked against its selection.

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Control Data had proposed the 6600 for MAC although MAC people consider the 3600 as a better machine for the application. Control Data was discounted when they declined to consider substantial design modifications for the computer to be supplied to MAC. UNIVAC proposed a complex multi-processor system currently being designed for a classified military weapons system. However its delivery date was not early enough to be considered seriously by the MAC project. RCA's 3301 was also considered but rejected as lacking in size and I/O control features.

In among the finishers was Digital Equipment Corp. which offered a multi-processor version of its PDP-6 computer for the MAC project. Although its large scale offering was not accepted, a $1 million PDP-6 was purchased by MAC as a peripheral processor to control high interaction rate devices such as visual displays on the time-shared system.

The MAC version of the GE 635 will use a special modification which allows segmented memory addressing and storage. This permits the supervisory software system to allocate a single program to noncontiguous sections of memory...an important feature when several programs are being moved in and out of memory concurrently.

Delivery of the GE computer to MAC is expected in the early winter of 1965.

The MAC award came just as GE was officially taking the wraps off the first two members of its Compatibles-600 line, the 625 and 635. These machines were first described in our issue of April 30. The computers feature a 36-bit word, divided into six characters of 6-bits each. Shunning the new ASCII code, the new GE computers use BCD/binary code for data manipulation and arithmetic. The GE-625 performs fixed point add and multiply in 3.0 usec. and 7.0 usec. respectively...floating point add and multiply takes 3.0 usec. and 6.0 usec. respectively. The GE-635 cuts execution time on fixed and floating point add to 1.8 usec. and 2.7 usec. respectively. Multiply times are approximately those of the 625. The 635 is now the largest regular member of the GE's computer line with a price tag of $2 million and up (lease prices start at $45,000 per month). The GE-625 is priced at approximately 25% less.

In creating the design specifications for the first two members of the Compatibles-600, GE drew heavily upon its extensive internal experience with large-scale scientific computers, particularly with the IBM 7000 series. Indeed, design specifications for the 600 family read like a hypothetical "current limitations list" drafted by a frustrated IBM 7000-series user. Design criteria included:

1) Faster "turnaround" time for jobs
2) Low "overhead" time during which the processor is not doing useful work
3) "Multiprogramming" capability so that several jobs can be worked on virtually simultaneously
4) "Real-Time" applications, such as accommodation of individual console stations in a time-sharing net
5) Integrated series of processor and memory sizes
6) Horizontal growth capability, allowing for a tailored system.

To achieve these specs, GE's 625 and 635 offer a system consisting of three major modules plus a complement of peripheral devices including a data communications network controller. Memory, Processor, and I/O Controller are the three modules. Therefore both multiprocessor and multicomputer configurations are available in the Compatibles-600. In multiprocessor systems, only one control Processor is used. All other Processors in the system are usually subservient to the control Processor. In a multicomputer configuration more than one control Processor is used in the system.

The key to the efficiency of operations on a GE-600 computer is its General Comprehensive Operation Supervisor (GECOS) which controls the placing and running of all other programs. As the executive system, it handles real-time operations, multiprogramming, and a variety of hardware configurations. GECOS can be tailored to each installation. Because of this, GE is currently claiming that GECOS is "the most complete executive routine in the computer industry."

People have long considered GE a potentially formidable competitor in the computer field because of its extensive financial resources and technical depth. The latter was impressively demonstrated in the software development for the Compatibles-600 which drew on the technical talents and experience of people in a number of GE's departments (GE currently uses about 200 computers and employs approximately 2000 programmers). For example, the FORTRAN IV compiler is being developed by the Missile and Space Division of GE. The Macro Assembly Program and Loader is being done at GE's Advanced Engine Technology Department. The COBOL compiler and GECOS are being done by the main software team at the Computer Department. An anticipated result of this parallel development is that when the first GE-600 computer, a 635, is delivered to GE's Telecommunications and Information Processing Department late this year, a complete operating software system will accompany it.

The most immediate market for the GE-600 appears to be as a replacement for such large computers as the IBM 7090 and 7094, Philco 2000, Control Data 1604A and UNIVAC 1107. Of these, the 300 some installations of 7090 series computers is the most significant. The GE-635 is about four to five times faster in operating speeds than the 7090, for about 20% less cost. This performance comparison is at lease one of the factors accounting for GE's decision to replace eight 7090 computers used internally with 600 computers during the next eighteen months. In fact, the total internal market for the GE-600 is estimated to be between 14-18 machines during the next two years.

GE's market strategy for the GE-600 is apparently based upon the following points:

1) The GE-600 will be available for delivery early in 1965, about ten months before IBM is scheduled to start deliveries on the System/360.
2) GE is stressing the point that a 635 is already operating in Phoenix. Before the end of the year, GE will offer time testing on FORTRAN IV programs.
3) GE will offer a combination hardware/software simulator for 7090 series computers, allowing users to continue to run their production programs while reprogramming gradually in GE-600 language.

4) GE is offering an "unlimited use clause" in their lease contracts for the 600, offering the user unrestricted use of the computer for a fixed monthly rental.

GE does have a very favorable market situation for the 600 in the military/space command and control system field. The 600 is backed up with an admirably integrated series of aerospace and military computers, viz., GE's Light Military Electronics Department has developed four micro-miniaturized aerospace computers, the A-212, A-224, A-218, and A-605. The A-605 is program compatible with the M-605 and M-625, two ground-based military computers. The M-625 is the technical equivalent of the GE-625 computer, but built to military environment specifications. GE is currently bidding this combination of "total environment" computer systems to NASA and the Pentagon with indications of an encouraging response.

Next step in the GE-600 line? The 645 is not yet fully defined, but current indications are that it will look quite like the computer to be delivered to MAC...offering multi-segmented memory allocation, and direct addressing to storage capacity in the millions of words.

GE ESTABLISHES EUROPEAN COMPUTER BASE

GE's recent $43 million investment in the French computer manufacturer, Compagnie des Machines Bull, offers another sign that GE is in the process of executing a well-financed plan to capture a sizable dollar volume of sales in the computer market. Readers may remember our comment last issue on GE's plans to increase its computer manufacturing facilities and sales staff in this country by 50% within a year. Insiders at GE are said to feel that they will grow to about $600 million per year in revenues from its computer business by 1970...having by that time obtained between 8% and 9% of the market.

Under the arrangements of GE's investment in Bull, GE will have a 49% interest in two of the three companies which take over the activities of Bull. One of these, Societe Industrielle Bull General Electric (SIBGE) will manufacture data processing equipment and conduct R&D activities; the other, Societe de Promotion Commerciale Bull (PCB) will engage in market research and market development activities. GE will own 51% of the third company, Compagnie Bull General Electric, which will serve as a marketing organization.

GE's interest in Bull is easy to understand. Bull offers GE the market base and marketing organization it has been seeking in the European computer market...a market that is growing at a rate about one and a half times that of the U.S....with about 4,000 computers currently installed and an estimated 18,000 to be in place by 1970. Bull has already served as a major outlet for computers from an American manufacturer...RCA's 301 has been imported (and more recently manufactured) and sold by Bull as its Gamma 30...an estimated 160 301's have been sold in this manner. Bull has been supplying the high speed card punch being used with GE's computers. Although GE currently has only four computers in Europe... all 225's...we would estimate that GE can place through the new Bull arrangement about 35 of its 200 and 400 computers in Europe before the end of 1965. This represents equipment valued at nearly $50 million... exceeding GE's initial investment in Bull.

Although GE's computer business has only a minor effect on its financial position...contributing this year less than .6% of its expected $5 billion in total sales...GE's moves in the field can be expected to have a sizable impact on its competitors in the computer marketplace in the next several years.

COLLINS RADIO INDICATES ITS SEEKING LARGER ROLE IN COMPUTER FIELD

Collins Radio is not often considered as an important factor in the computer and EDP market, but signs are that this situation is changing. Collins has been making a considerable investment in developing its data communication and processing product line. We understand this activity may soon yield fruit in the form of the first commercially available data processing system using integrated circuitry. The system, likely to be called the C-8500 communications data processor, will have multi-processing capabilities permitting two or more processing units to be tied to a single memory. This step will eliminate the present requirement of having to use duplicate C-8400 data processor installations when continuous on-line operation of a data communications system is desired.

Collins apparently recognizes the fact that a computer for message switching and data communications processing can also collect and analyze a significant amount of management control information...accomplishing some important commercial data processing activities in the process. For example, Collins recently sold to Delta Airlines a $1.8 million computer-controlled teletype message switching system using two of its C-8400 computers. During the process of handling some 80,000 administrative and operational messages a day, the system will soon be expected to complete payroll computation, fare billing, and maintenance records for the entire Delta system. In fact, Collins describes its C-8400 computer as having data processing capabilities equal to that of an IBM 1410 computer.

Collins has also recently landed (but not yet announced) one of the largest computer-controlled communications switching system contracts ever placed commercially. It is with the Canadian National Teletype Co. and calls for the installation of three C-8400's for teletype message switching beginning in the late fall of this year. Total cost of this system is expected to exceed $3 million.

The Communications and Data Systems Division of Collins, the group which makes the C-8400 and other Collins digital computers for scientific computation, data processing, telecommunications message switching and other purposes, has been contributing an ever increasing share of Collins' sales volume. Last year approximately $35 million in sales was registered by this division out of $250 million in total net sales for the company.

Collins' decision to place more stress on the commercial data processing capabilities of their computers comes at a time when they are meeting increasing competition in the communications data processing area from ITT, UNIVAC, and now from the System/360, whose design is particularly favorable for data communications. In anticipation of selling its equipment to users of geographically remote System/360's, Collins has announced that its data processors have been microprogrammed to have a command structure that is compatable with the new IBM equipment.

To date, Collins has produced 26 C-8400's, with commercial installations at Delta Airlines and the New York Central Railroad, several military message switching applications, and Collins' own extensive teletype switching network working out of Cedar Rapids, Iowa. Collins' outlook is promising because it is offering a capable computer currently, and perhaps a significantly improved model soon, for the computer-controlled data communications field which is expected to grow from a sales volume of some $120 million annually this year to some $2.5 billion annually by 1970...several computer manufacturers have predicted that by 1970 70% of all computers sold will use communications equipment. Key to growth for Collins in this expanding field will be its ability to convince potential customers they can use Collins equipment more efficiently for handling their data communications requirements than communications controllers supplied by the major computer builders. Excepting computer customers of IBM, GE and UNIVAC, Collins may well be able to do this effectively.

GOVERNMENT SPENDING FOR DATA PROCESSING IN FISCAL 1964 ESTIMATED AT $1106 MILLION, A 41% INCREASE OVER 1963; IBM'S SHARE OF GOVERNMENT COMPUTERS DECLINES FROM 65% TO 54%

The Federal Government, the nation's largest computer user...representing nearly 11% of all the computers in use in this country...has just completed its second inventory of DP equipment. The "1964 Inventory in Automatic Data Processing (ADP) Equipment in the Federal Government" has been released by the House Post Office & Civil Service Committee. The Bureau of the Budget, which prepares this report, has added several new sections to this year's inventory, including computer applications at each installation, average hourly usage per month, and an indication of whether the equipment is leased or owned, and of whether it is operated by a contractor under a cost basis contract.

Among the significant statistics provided by this publication are:

* 1767 computers were in use in the Federal Government in fiscal 1964, up from 1326 last year. This number is expected to rise to 1946 by the end of fiscal 1965, and climb to 2150 by fiscal 1966.
* IBM supplied 940 of the Federal Government's computers in fiscal 1964, representing 54% of the total. This represents a sharp downward move from 856 IBM computers or 65% of the computers used by the government during fiscal 1963. Next in the numbers of computers in 1964 is NCR with 191, followed by Control Data with 138, RCA with 97 and UNIVAC with 92.
* Total costs for data processing in the Federal Government were $1106 million in fiscal 1964, up 41% from $785 million in fiscal 1963. The largest portion of this increase of $321 million is accounted for by $278 million used to purchase leased computers and related equipment. Estimated 1965 costs of $1053 million represent a slight reduction reflecting a lower level of computer purchases.
* The percentage of purchased computers in the government rose from 21% in 1963 to 39% in 1964 and is expected to reach 46% by 1965.

* In fiscal 1964 37 government agencies will operate 889 computer units...each computer unit being defined as a separate administration site for a computer installation.
* The Department of Defense accounted for 67% of the total government spending for data processing in fiscal 1964.

The 360-page report can be ordered from the U.S. Government Printing Office, Washington 25, D.C. for one dollar.

Programmers for Rent: An innovation in solving the shortage of programming manpower during major system development work at computer installations is being offered by a new firm, DATAtemp, Inc. of New York City. They maintain a staff of experienced programmers who are available on a daily or monthly basis. With over 1000 computers in the New York City area, and frequent "crash" programming jobs in progress, the service sounds like a bright idea.

Things to look for: A revitalization of Benson-Lehner's product line for the digital plotter field following its recent absorption into UGC Instruments, Inc., a subsidiary of the United Gas Company. UGC Instruments will also use B-L's manufacturing facilities to expand production of the former's portable source data collection devices which record on 1/4" magnetic tape. These units are becoming increasingly popular in meter reading applications...A discussion in our next issue of the corporate tug-of-war between IBM and Xerox over who keeps out of whose bailiwick in the computer and the office copier field...also, an analysis of the recent series of "price adjustments" in the computer field, and their particular significance to RCA and UNIVAC.

SIGNIFICANT NEW COMPUTER ORDERS

Company	Address	Computer On Order	Expected Installation Date
Aileen, Inc.	New York, N.Y.	IBM 1460	September, 1964
American Tel. & Tel. Co.	Mount Kisco, N.Y.	IBM 7080	September, 1964
Auburn University	Auburn, Ala.	IBM 7040	July, 1964
Chubb & Son, Inc.	Short Hills, N.Y.	IBM 7010	November, 1964
Conn. Medical Service, Inc.	New Haven, Conn.	IBM 1460	December, 1964
Control Data Corp.	Rockville, Md.	CDC 3600, CDC 3200	July, August 1964
Douglas Aircraft Co.	Santa Monica, Calif.	IBM 1460	October, 1964
First National Bank of Omaha	Omaha, Neb.	NCR 315	September, 1964
Fleet Numerical Weather Control	Monterey, Calif.	CDC 3200	August, 1964
General Tire & Rubber Co.	Akron, Ohio	RCA 301	October, 1964
IDR Co.	Philadelphia, Pa.	IBM 1460	September, 1964
Inter. Tel. & Tel.	Paramus, N.J.	IBM 7094	September, 1964
Martin Marietta Corp.	Baltimore, Md.	IBM 1460	September, 1964
McDonnell Automation Center	St. Louis, Mo.	IBM 1460	October, 1964
MFA Insurance Co.	Columbia, Mo.	IBM 1460	September, 1964
Niagara Mohawk Power Corp.	Syracuse, N.Y.	RCA 301	January, 1965
Reader's Digest Assoc.	Pleasantville, N.Y.	RCA 3301	August, 1964
Sinclair Oil & Gas Co.	Tulsa, Okla.	IBM 7074	October, 1964
United California Bank	Los Angeles, Calif.	6-IBM 1460	February, 1965
University of Denver	Denver, Colo.	B5000	August, 1964

STOCK MARKET REPORT ON SELECTED EDP FIRMS

June 29 - July 10, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	648	46 3/4	44 1/8	46	+3/8	+0.82
American R & D	27	18 1/4	70	22 3/4	20 1/4	20 3/4	-1 7/8	-8.29
Burroughs	27 1/4	22 1/8	2863	27 1/4	23 3/4	26 5/8	+2 5/8	+10.94
Control Data	111 7/8	74 1/4	3243	100 1/2	92 1/2	97 5/8	-1/8	-0.13
Electronic Associates	27 3/8	22 1/8	310	25 3/4	23 1/4	24	-1 1/8	-4.48
General Dynamics	31 5/8	23 1/2	725	27 1/2	26 5/8	26 5/8	-7/8	-3.18
General Electric	90 5/8	78 3/4	1979	83	79 1/4	81 7/8	+2 7/8	+3.64
General Precision	32 3/8	25 1/2	228	28 1/8	27	28	+1 1/8	+4.19
Honeywell	148 3/4	115 1/4	614	141	134 1/4	137	-3/8	-0.27
IBM	494	458 3/4	582	492	477	482 1/2	+4 1/2	+0.94
Inter. Tel. and Tel.	60	52 5/8	534	58 3/4	56 1/2	56 1/2	-1/2	-0.88
Litton Industries	79 5/8	58 1/4	866	66 7/8	61 7/8	63 5/8	-3/4	-1.17
Nat. Cash Register	79 3/4	63	477	69 3/4	68 1/4	69 1/4	------	-----
Packard Bell	15 1/2	7	209	8 3/8	7	7 5/8	-3/4	-8.96
RCA	39 1/4	30	3944	33 3/4	31 3/4	33 3/8	+1/2	+1.52
Sperry Rand	21 3/4	14	3976	15 1/4	14	14 3/8	-3/8	-2.54
Xerox	122 3/8	70	2041	117 7/8	109 1/4	110	-6 3/8	-5.48
NYSE COMPUTER STOCK EXCHANGE							-0.07	-0.78
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	217	26 1/4	23 1/8	24 1/8	-1 1/4	-4.93
Bunker-Ramo*	13 5/8	7 5/8	619	10 7/8	8 1/2	9 1/8	-1 1/8	-10.98
Clary	7 1/2	5 1/4	92	6 3/8	5 1/2	6	+1/2	+9.09
Computer Sciences	29 5/8	15 3/8	85	20 1/4	17	17 1/8	-2 3/8	-12.18
Potter Instrument	12 1/4	6	99	7 7/8	6	6 7/8	-7/8	-11.29
* name changed from Teleregister								
AMEX COMPUTER STOCK AVERAGE							-1.03	-6.06

	1964 High Bid	1964 Low Bid	July 10 Bid	July 10 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	12 1/4	13 1/4	13 1/8
Computer Control	19 5/8	12 3/4	17 3/4	19	18 1/2
Data Products	8 1/8	3 5/8	3 5/8	4 1/8	4
Digitronics	20	9 1/4	9 3/4	10 3/4	10 1/2
Dura Corp.	28 1/2	23 7/8	27 1/2	29	26 1/2

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July 30, 1964 Vol. 1, No. 9

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

XEROX GEARS UP TO ENTER COMPUTER-RELATED FIELD; IBM STUDIES OFFICE COPIER MARKET

One of the most subtle and interesting examples we have witnessed in some time of a battle of nerve and wits between two major corporations has been taking place between the Xerox Corp. and IBM. Both companies appear headed for a show-down between competition and cooperation in a major new market area...image storage,processing and retrieval.

This confrontation is all the more interesting because the similarities between the two firms are striking. Both firms have outstanding reputations as growth companies. Both use roughly the same formula for business enterprise, viz., produce a device used to increase the efficiency of business operations whose manufacturing cost is a relatively low percentage of its selling price, and lease it to customers to extend its revenue-producing life as long as possible. Both firms produce equipment designed to help management deal with what is called the "information explosion", the growing amount of facts and figures which a business decision-maker must consider in guiding his company.

Xerox is of course the newer of these companies, and currently has sales only one-twelfth those of IBM...and these being generated almost entirely from its office copiers. However, Xerox has had a corporate growth that has paralleled IBM's closely enough to make credible for most observers Xerox's President Wilson's remark at the recent Annual Meeting that his company has achieved "strength in finances, organization, and reputation that makes it possible for us to attack the development of major systems for the future." Xerox's recent recruiting ads reinforce this theme with the headline: "If you believe Xerox copiers are the answer to the world-wide information explosion, you're not working at Xerox."

The key questions, of course, is what are the "major systems" which Xerox's president refers to. We believe that the rosette stone for understanding the goal of Xerox's new product planning is found in the company's increasing use of the phrase "graphic communications"...the encoding, transmission, processing, and display of visual images. Xerox apparently foresees that graphic communication systems which would be able to store millions of images of letters, pages of texts, reports, documents, etc., alter their formats, and locate and retrieve them by means of relatively simple instructions will offer the only feasible solution to the information store and retrieval problems now being faced by the military and

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administrative sections of government, and by large companies and research organizations. Revealing its alertness to the importance of this market, a Xerox official predicted at a recent Security Analysts meeting that the information and retrieval cost for government and industry will reach $30 billion a year by the early 1970's.

The ingredients of the type of graphic communications systems which Xerox can be judged to be developing include:

1. A device to encode images into a form suitable for storage. This might well utilize the basic electrostatic image recording techniques now being used in Xerox's office copiers;

2. a large-scale, low cost memory medium for storing the image;

3. a method of locating a desired image in storage when only a minuscule amount of information about the image is known;

4. a method of processing images as two-dimensional or even three-dimensional objects; and

5. a method of retrieving and displaying the desired image and producing a "hard copy" on demand.

It should be clear from the above description that computer technology is heavily involved in the design and development of such graphic communication systems. Recognizing this, Xerox has recruited one of the largest R&D staffs experienced in computers and the information sciences ever assembled by a company its size. Technical progress in the development of such systems at Xerox has been very encouraging, we understand, and product announcements specifically designed to serve as part of such a system should be coming forth from Xerox by mid-1965.

In one sense, Xerox can be considered already underway in the graphic communications field for its announced LDX (Long Distance Xerography) fascimile system is designed to convert the image of documents into electrical signals and transmit them to distant locations and reproduce them. Also, Xerox's 50%-owned British company, Rank Xerox, has been offering for some time a Xeronic high-speed printer, a device for printing out information from a computer through electrostatic reproduction techniques and at higher speeds than available through conventional impact printers. We understand, however, that there are no immediate plans to introduce this product into the U.S. due to the lack of an appropriately-trained marketing and service force. (Xerox's much talked about new product to be introduced this October is not in the computer-aided graphic communications area. It is an extension of its office copier line into the office duplicator field to compete with offset and ditto reproduction methods. The machine will produce copies at about 100 per minute at a cost of about $1\frac{1}{4}$ cents per copy. It should provide for Xerox a significant expansion in market and sales, and generate further revenue to meet the high investment required to achieve an important position in the market for computer-based image storage and retrieval systems equipment.)

Of course, in-house R&D and products from affiliated companies cannot be expected to provide Xerox the full range of technical products and skills needed for graphic communications systems. Therefore, a series of acquisitions and licensing agreements can be expected during the next two

years, particularly with companies developing and producing advanced computer memories and with companies involved in the digital display field. The acquisition of Electro-Optical Systems, Inc. and Electro-Optical Instruments, Inc. at the end of 1963 was a logical step in this acquisition plan, for it gave Xerox an advanced position in laser technology at a time when lasers are expected to offer in the late 60's an extremely efficient medium for the transmission of vast quantities of information within and between computers. Xerox has apparently also been talking recently with Scientific Data Systems, Inc. about the use of several of SDS's computers within image storage and processing systems Xerox is developing.

The next step in Xerox's acquisition program is uncertain, of course, but we feel that Itek Corp. has the type of technical competence and resources, and new product developments,that fit very snugly into Xerox's plans for a leadership position in graphic communications.

IBM is not unmindful of the proposed entry of Xerox into the computer-based information processing systems market through image processing systems...and apparently not enthusiastic about the prospect of a major new competitor in this important new market for information processing equipment. This concern is reinforced by the fact that IBM does not have a firm market base in the information storage and retrieval market (its only major work to date in this area has been the Walnut System for the C.I.A. and the Cypress System for the Redstone Arsenal). Therefore it does not enjoy a market advantage similar to the large population of IBM punched card users it could upgrade to its computer systems.

In a presumed effort to discourage Xerox from entering this field by threatening to retaliate through aggressive marketing of products competitive to Xerox's current product line, IBM recently announced it was carrying on talks with Harris-Intertype about acquiring a license to manufacture and market the electrostatic office copier developed by H-I. These negotiations have not resulted in any firm agreement yet, however. IBM's moves toward entry in the office copier field are credible, however, as extensions of its recent entries into the microfilm products and dictating equipment fields. To back up its licensing talks, we have learned from contacts at IBM's General Products Laboratory that IBM is also developing a prototype of an office copier which does not require specially treated paper as does H-I's (the prototype's operation relies on the ability of certain ions to become temporarily polarized when exposed to light). Demonstration units of this new development should be available for evaluation by IBM's management shortly and if IBM decides to market this device, first deliveries can be expected by mid-1965.

A significant share of the market for image processing information equipment is estimated at $5 billion a year by 1970. The stakes are therefore high in the shuffling for position taking place between IBM and Xerox. The outcome is by no means clear, but the situation merits interested observation in the months ahead.

*Hopeful bench-sitter in the image processing systems field: Kodak's Recordak Corp.

RAYTHEON RE-ENTERS COMPUTER FIELD WITH PURCHASE OF PACKARD-BELL COMPUTER

Raytheon returned to active participation in the computer field after a seven year absence when it agreed to purchase the assets of the computer division of Packard-Bell Electronics Corp. for an estimated $5 million last week. It left the computer field in 1957 when it sold its 40% interest in the Datamatic Corp. to Honeywell.

Raytheon's motivation in acquiring PB's computer group seems clear. They have been handicapped in their defense business during the past several years by not having a data processing capability to support their military operations. Both PB's 250 and 440 computers have favorable characteristics for use as a military weapons system computer, an automatic check-out controller, and missile launch and range data processor. They should therefore provide important in-house computer support to Raytheon's Space and Information Systems division.

Through the purchase, Raytheon acquires the patents and rights on the PB 250 computer which currently has 155 installations and about 10 orders, and the PB 440 microprogrammed computer with 4 installations and about 8 orders. They also acquire the R&D work on a new line of computing equipment PB is developing...emphasizing hybrid computing and systems applications. They also acquire the computer division's line of data converters and digital circuit modules.

Raytheon is expected to continue the commercial marketing of PB's computers, although restricting the markets to scientific computation, real-time data processing, and systems simulation. This commercial activity should add to the desired broadening of Raytheon's sales base...for the company currently dones 80% of their business with the government.

Total sales this year for PB's Computer Division are in the neighborhood of $6 million. Raytheon's sales this year are expected to be about $500 million.

IBM MAKES ITS SUPER-SCALE COMPUTER OFFERING OFFICIAL

IBM confirmed this past week the discussion in our issue of June 30 of their plans to build a computer "more powerful than any computer now available". Side-stepping the label Model 90, IBM is calling it the Model 92 of its System/360. The machine will use integrated and monolithic circuitry to achieve an operation time on its 64-bit word of .18 usecs. for a floating point add and .27 usecs. for a floating point multiply. When the machine is properly programmed to take optimum advantage of its multi-processing features, the Model 92 can perform nearly 17 million floating point additions per second...making it about six times faster than its super-scale competitor, the Control Data 6600, at about a two-thirds increase in cost.

The Model 92 comes in two sizes, the 92I with 65K words of memory and the 92J with 131K words of memory. The 92I will have a typical systems rental of about $140,000 per month, while a typical 92J system will rent for about $180,000 per month.

The Model 92 offers in addition up to 2 million words of 8 usec. directly addressable core memory (for another $100,000 a month in rental). The .5 usec. main core memory uses interleaving techniques to decrease the effective access time by overlapping access cycles.

The Model 92's threat to the market life of Control Data's 6600 is not likely to be effective during the next eighteen months. The 6600 is available for delivery within the next twelve months...the Model 92 has a 30 month delivery cycle which puts the first delivery off until the winter of 1967. Also, the 6600 is being demonstrated today...the Model 92 is using what IBM calls "exploratory technology", indicating that the methods of implementing the design features of the 92 have not yet been completely resolved. In fact, according to insiders at IBM, only a portion of the critical sections of the machine have been checked-out at Poughkeepsie. Significant portions of the Model 92 will not be available for testing until the spring of 1965.

Control Data also has a new super-scale computer in development. Called the 6800, it is said to be five to six times faster than the 6600... putting it in the same operating range as the Model 92, with a similar price structure and a delivery schedule said to be nine months ahead of the Model 92. The Model 92's strongest competitive features lie in the wide range of System/360 peripheral equipment available with it, and the huge programming library that will support it and the other members of the System/360.

ACQUISITIONS "ABOUT-TO-HAPPEN" DEPARTMENT

We understand that Giannini Controls Corp. is planning to acquire Contronics, Inc., a producer of control systems for computer-based display systems. Giannini's Conrac Division currently supplies monitors for Contronics' display systems which are being installed at American Bosch Arma Corp., G. C. Dewey Corp. and in three sites by Delta Airlines.

The acquisition on Contronics will represent a vertical build-up for Giannini in the rapidly expanding data display field...expected to produce $40 million in sales this year. Sales for Contronics in the past year are estimated at $250,000. Giannini's sales for 1964 are expected to be $30 million.

COLLINS RADIO COMBINES DIVISIONS

Collins Radio gave another indication this past week of its interest in playing a larger role in the computer market with systems that handle data communications as well as data processing (see Collins comment in July 15th issue) when it announced that it is combining its Communications and Data Systems Division with its Dallas Division. This combination should strengthen marketing and applications development for its computer-oriented system. Collins also moved to strengthen its European marketing effort by establishing a corporate vice-presidency there for the first time...occupied by T. A. Campobasso, formerly the director of sales for the Dallas Division.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF JULY 30, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	20	2
	ASI 2100	Y	$3000	12/63	5	2
Autonetics	RECOMP II	Y	$2495	11/58	66	X
	RECOMP III	Y	$1495	6/61	21	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	11	3
	RW-300	Y	$5000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$7000	12/63	8	16
	TRW-530	Y	$6000	8/61	22	4
Burroughs	205	N	$4600	1/54	63	X
	220	N	$14,000	10/58	43	X
	E101-103	N	$875	1/56	128	X
	E2100	Y	$535	8/64	0	970
	B100	Y	$2800	11/64	0	30
	B250	Y	$4200	11/61	87	19
	B260	Y	$3750	11/62	60	26
	B270	Y	$7000	7/62	80	36
	B280	Y	$6500	7/62	89	42
	B370	Y	$8400	7/65	0	13
	B5000	Y	$16,200	3/63	34	24
Clary	DE-60/DE-60M	Y	$525	2/60	235	5
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	36	18
	DDP-224	Y	$3300	12/64	0	5
Control Data Corporation	G-15	N	$1000	7/55	321	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/160G	Y	$1750/$3500/$12,000	5/60;7/61;3/64	375	26
	924/924A	Y	$11,000	8/61	27	4
	1604/1604A	Y	$38,000	1/60	60	X
	3200	Y	$12,000	5/64	9	64
	3400	Y	$25,000	11/64	0	19
	3600	Y	$58,000	6/63	22	32
	6600	Y	$110,000	8/64	1	3
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	54	2
	PDP-4	Y	Sold only about $60,000	8/62	39	11
	PDP-5	Y	Sold only about $25,000	9/63	48	10
	PDP-6	Y	Sold only about $300,000	8/64	0	6
	PDP-7	Y	Sold only about $72,000	10/64	0	8
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	Sold only about $20,000	6/63	145	95
General Electric	205	Y	$2900	9/64	0	10
	210	Y	$16,000	7/59	60	X
	215	Y	$3500	11/63	23	10
	225	Y	$7000	1/61	120	2
	235	Y	$10,900	12/63	16	19
	415	Y	$5500	5/64	6	105
	425	Y	$7500	7/64	1	44
	435	Y	$12,000	10/64	0	21
	455	Y	$18,000	6/65	0	9
	465	Y	$24,000	6/65	0	6
	625	Y	$55,000	2/65	0	2
	635	Y	$50,000	12/64	0	4
General Precision	LGP-21	Y	$725	12/62	120	59
	LGP-30	semi	$1300	9/56	440	5
	RPC-4000	Y	$1875	1/61	101	2
Honeywell Electronic Data Processing	H-200	Y	$4200	3/64	18	600
	H-300	Y	$3900	7/65	0	5
	H-400	Y	$5000	12/61	100	10
	H-800	Y	$22,000	12/60	62	7
	H-1400	Y	$14,000	1/64	6	6

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
	H-1800	Y	$30,000	1/64	4	7
	H-2200	Y	$11,000	10/65	0	10
	DATAmatic 1000	N	---	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3600	12/57	535	X
	360/30	Y	$4800	7/65	0	900
	360/40	Y	$9600	7/65	0	300
	360/50	Y	$18,000	9/65	0	270
	360/60	Y	$35,000	10/65	0	108
	360/62	Y	$50,000	11/65	0	26
	360/70	Y	$80,000	10/65	0	120
	650-card	N	$4000	11/54	396	X
	650-RAMAC	N	$9000	11/54	78	X
	1401	Y	$4500	9/60	7260	910
	1401-G	Y	$1900	5/64	150	860
	1410	Y	$12,000	11/61	355	165
	1440	Y	$1800	4/63	970	1060
	1460	Y	$9800	10/63	350	600
	1620	Y	$2000	9/60	1495	36
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	48	40
	702	N	$6900	2/55	3	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	43	X
	7040	Y	$14,000	6/63	50	45
	7044	Y	$26,000	6/63	38	16
	705	N	$30,000	11/55	85	X
	7070, 2, 4	Y	$24,000	3/60	510	50
	7080	Y	$55,000	8/61	69	8
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	52	4
	7094	Y	$70,000	9/62	250	25
	7094 II	Y	$76,000	4/64	38	60
ITT	7300 ADX	Y	$18,000	7/62	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	158	X
	Monrobot XI	Y	$700	12/60	400	170
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	191	124
	NCR - 390	Y	$1850	5/61	615	195
	NCR - 395	Y	$650	5/64	33	200
Packard Bell	PB 250	Y	$1200	12/60	155	8
	PB 440	Y	$3500	3/64	4	8
Philco	1000	Y	$7010	6/63	15	0
	2000-212	Y	$52,000	1/63	5	2
	-210, 211	Y	$40,000	10/58	19	2
Radio Corp. of America	Bizmac	N		-/56	4	X
	RCA 301	Y	$6000	2/61	502	130
	RCA 3301	Y	$16,000	7/64	2	28
	RCA 501	Y	$15,000	6/59	96	4
	RCA 601	Y	$35,000	11/62	4	1
Scientific Data Systems, Inc.	SDS-92	Y	$900	12/64	0	1
	SDS-910	Y	$2000	8/62	74	36
	SDS-920	Y	$2700	9/62	60	10
	SDS-925	Y	$2500	12/64	0	5
	SDS-930	Y	$4000	6/64	3	13
	SDS-9300	Y	$7000	10/64	0	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	33	X
	III	Y	$20,000	8/62	72	42
	File Computers	N	$15,000	8/56	24	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	340	1
	Solid-State II	Y	$8500	9/62	42	4
	418	Y	$11,000	6/63	6	8
	490	Y	$26,000	12/61	33	20
	1004	Y	$1900	2/63	1480	730
	1050	Y	$8000	9/63	60	260
	1100 Series (except 1107)	N	$35,000	12/50	15	X
	1107	Y	$45,000	10/62	19	11
	1108	Y	$43,000	7/65	0	5
	LARC	Y	$135,000	5/60	2	X
X = no longer in production				TOTALS	20,668	10,068

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

July 13 - July 24, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	1172	49 1/2	45 1/4	48 1/4	+2 1/4	+4.89
American R & D	27	18 1/4	67	21 3/4	20 1/8	20 1/4	-1/2	-2.41
Burroughs	27 1/4	22 1/8	938	26 3/4	25 3/4	26 5/8	------	-----
Control Data	111 7/8	74 1/4	1884	100 1/4	88 3/4	89 1/8	-8 1/2	-8.71
Electronic Associates	27 3/8	21 3/8	399	23 7/8	21 3/8	21 3/4	-2 1/4	-9.38
General Dynamics	31 5/8	23 1/2	2517	30 7/8	26 3/4	30 1/4	+3 5/8	+13.62
General Electric	90 5/8	78 3/4	2391	85 3/4	82 1/8	84 3/4	+2 7/8	+3.51
General Precision	32 3/8	25 1/2	387	29 1/2	27 1/2	28 3/8	+3/8	+1.34
Honeywell	148 3/4	115 1/4	463	137 1/2	131	131	-6	-4.38
IBM	494	458 3/4	752	484	463 3/4	463 3/4	-18 3/4	-3.89
Inter. Tel. and Tel.	60	52 5/8	769	57	54 5/8	54 3/4	-1 3/4	-3.10
Litton Industries	79 5/8	58 1/4	976	67 3/8	63 7/8	65 7/8	+2 1/4	+3.54
Nat. Cash Register	79 3/4	63	2004	76 1/8	68 1/2	75 1/8	+5 7/8	+8.48
Packard Bell	15 1/2	7	166	7 7/8	7	7 1/8	-1/2	-6.56
RCA	39 1/4	30	4701	35	32 1/2	32 1/2	-7/8	-2.62
Sperry Rand	21 3/4	14	2952	15	14 1/8	15	+5/8	+4.35
Xerox	122 3/8	70	2871	117 5/8	110 1/4	115 1/4	+5 1/4	+4.77
NYSE COMPUTER STOCK AVERAGE							-1.18	+0.20
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	193	25 1/8	23 3/8	23 3/8	-3/4	-3.11
Bunker-Ramo	13 5/8	7 5/8	427	10 3/4	9 1/8	9 5/8	+1/2	+5.48
Clary	7 1/2	5 1/4	226	7 1/4	6	6 1/4	+1/4	+4.17
Computer Sciences	29 5/8	15 3/8	31	17 1/2	16 5/8	16 5/8	-1/2	-2.92
Potter Instrument	12 1/4	6	125	7	6	6 1/4	-5/8	-9.09
AMEX COMPUTER STOCK AVERAGE							-0.23	-1.09

	1964 High Bid	1964 Low Bid	July 24 Bid	July 24 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	14	14 7/8	12 1/4
Computer Control	19 5/8	12 3/4	16 5/8	17 3/4	17 3/4
Data Products	8 1/8	3 1/2	3 1/2	4	3 5/8
Digitronics	20	9 1/4	9 1/2	10 1/2	9 3/4
Dura Corp.	28 1/2	23 7/8	26 7/8	28 5/8	27 1/4

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E|D|P
INDUSTRY AND
MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES
IN THE ELECTRONIC DATA PROCESSING INDUSTRY,
AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

RCA SETS TO ANNOUNCE NEW COMPUTER SERIES DESIGNED TO BE PROGRAM COMPATIBLE WITH SYSTEM/360

Those who speculate that RCA is pulling out of the computer business should consider the following chronological symmetry: On December 2nd of last year Honeywell introduced its H-200 computer...a computer whose sales success is largely based on the fact that it has a machine command structure virtually identical to that of IBM's popular 1401...thereby enabling automatic program conversion between the two machines. The H-200 was introduced at the tail end of the marketing life of the 1401. On December 1st of this year RCA is expected to introduce a family of computers also virtually identical in command structure to a series of IBM computers. But in this case, the IBM computers are not in the closing phase of their marketing life...in fact they have not even been installed yet!...for RCA's new computer family is hardware compatible with the System/360.

RCA's new computer product line will be composed of five or six processors which range from a small-scale computer, smaller than anything now being offered by IBM in the System/360 to large systems faster than the model 70. RCA will use hybrid circuitry on the smaller members of the series, and integrated circuits and cryogenic memories in the largest units. Memory speeds range from 2 usecs. for access to two characters in the smallest machine to 1 usec. for access to 8 characters in the larger units. Over forty peripheral units will be available for the new RCA line...many of them will be newly announced at the time of the introduction of the computer series. Among these a non-impact printer using Videoscan techniques and a new line of tape transports is expected.

RCA's reasons for introducing a computer line which can execute programs written for System/360 are fairly apparent. First, they are counting on widespread acceptance of System/360. Second, they are counting on the prospect that many major users of System/360 will want to establish a second vendor relationship for computers, particularly when the second vendor offers an improved price/performance ratio and when his computer does not require a substantial additional investment in program development. Third, they are counting on the assumption that many System/360 users will be developing extensive data communication systems within their companies...thereby requiring a major central computer complex and numerous remote data processors at warehouses, plants, sales

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offices, etc. The central computer complex could logically be supplied by IBM while RCA can claim a considerable business of supplies for the remote units. Simple arithmetic suggests that if IBM continues to supply about 75% of the computer systems in the U.S., and if members of RCA's new product line were used by only one-tenth of these IBM users, than RCA could conceivably move from a current 3.5% of the market to 5% to 7% in the course of the next several years.

The most immediately attractive member of the new RCA line would appear to be the smallest member of the series, a machine which might be called the "model 20" if it were part of the System/360 line. This unit will feature the 2 usec. memory, with 4K to 64K positions of memory, and have a typical system rental cost of $2500...including card reader/punch and a 300 lpm printer. The unit will be available for delivery by May of next year, making it contemporaneous with the earliest models available for installation of the System/360. There is a possibility that this unit will have an early announcement in late October as a precursor to the full new RCA line.

Product planning goal for the new RCA series to a price/performance ratio is between 25% and 50% lower than IBM's. This is certainly possible, for the command structure of RCA's new machines means that the extensive program library being developed by IBM for the System/360 can be annexed as an impressive arsenal of programming resources without major new program development costs by RCA.

The decision to move ahead with an IBM-compatible family of computers at RCA had to overcome two main objections: One, the new machines will not be able to offer any conversion aids for current users of RCA's computer line...the users of some 500 301 computers will not be pleased to see that RCA is not providing program conversion support for them to its new product line...although an analysis at RCA showed that most 301 running time was used on utility programs of the type that will be offered as standard programming support by RCA for its new product line in any case. Two, the System/360 is disc oriented while RCA's peripheral line does not include any self-manufactured disc units. This objection was overcome with the argument that most users will prefer IBM-built rotating memories anyway, even though RCA is well along with the development of medium-capacity random access memory units of several designs.

The decision of RCA to initiate a strong new push in the computer market place may come as a surprise to many people, since speculation has been frequently heard recently that RCA was withdrawing from the computer business upon regaining their investment in EDP. However, progress for RCA in the computer field has been steady, if painful at times, for RCA. The table below shows sales and rental revenues, and computer bookings for each year since RCA EDP group was established in 1958.

YEAR	SALES & RENTAL REVENUE	COMPUTER BOOKINGS
1958	$ 5.8	14
1959	4.7	40
1960	14.6	157
1961	28.7	289
1962	50.3	458
1963	77.3	653
1964	100E	800

RCA's current market position is the result of concentrated selling effort in selective computer markets. A breakdown of RCA EDP systems currently installed by market catagory is:

Manufacturing -- includes construction and publishing	21%
Financial -- includes insurance, brokers and credit unions	18%
Distribution & Services -- includes schools and hospitals	9%
Utilities and Transportation	17%
Government -- Federal, State, and Local	35%

Whether RCA will continue its selective market selling with the new product line is difficult to determine at this point, but it is clear that RCA has taken a direction sharply different from its previous course in the computer industry. In doing so it has greatly strengthened the contention that with the announcement of the System/360 IBM has set new standards for data processing equipment as well as changed the guidelines to success in marketing a computer system.

SHIPMENTS OF COMPUTERS IN U.S. HITS $860 MILLION IN 1963, UP 25.4% OVER 1962

Shipments of computers and related data processing equipment in the U.S. reached $860 million in 1963, up 25.4% from $685 million the previous year, according to figures recently released by the U.S. Department of Commerce. This increase was reached in spite of the fact that the number of digital computers shipped fell to 7,533 from 8,038 in 1962...indicating an increase of nearly 50% in the average value of digital computer systems shipped in 1963 over the previous year ($100,000 vs. $67,600). A table providing a breakdown of these figures is provided below.

DIGITAL EQUIPMENT ADDS SIXTH COMPUTER TO LINE; PREPARES TO PUBLISH AN ANNUAL REPORT FOR THE FIRST TIME

An impressive indication of the depth of penetration of computer applications in certain fields is given by the recent appearance on the market of computers with a general-purpose construction but incorporating special input/output facilities designed for a specific market. Such a machine is the LINC (Laboratory Instrument Computer), a computer for biomedical research now being offered by Digital Equipment Corp. The LINC, originally designed and developed at MIT under contracts from the National Institute of Health, offers built-in analog-to-digital converters to let the user directly connect the computer to laboratory instruments such as voltmeters, timers, amplifiers, thermistors, etc. Over two dozen LINCs constructed during the development program at MIT are already in use in laboratories throughout the country.

The LINC performs several functions normally performed by costly special-purpose devices or assistants in the research laboratory. For example, it can generate stimuli, convert the analog responses from various instruments into digital numbers which it processes and then controls the stimuli in relation to responses...thereby achieving a feedback control loop without special purpose equipment. LINC can also display responses before or after processing, store data on high-density magnetic tape, extract stored data for display of selected observations and calculated distributions, correlations, histograms, and other results. In doing this processing, LINC is able to compress or expand data, both in time and physical volume, and display it for analysis....conventional laboratory recorders and electronic monitoring equipment are usually unable to accomplish this data analysis on a real-time basis, and they do not offer the programmable capability of the LINC to handle a diversity of data processing and signal analysis jobs.

LINC offers a core memory of 2048 12-bit words with a cycle time of 8 usecs. Its 16 analog input channels accept up to 30,000 signals per second, convert them into 8-bit digital numbers, and store them in memory. The order code includes 48 instructions.

The LINC sells for $54,500 and has a first delivery scheduled for October, 1964. It is the sixth addition to Digital Equipment's quite successful line of computers designed for use as system components or as independent computers offered to sophisticated users. Of its existing line of computers, the PDP-4 and PDP-5 are enjoying considerable success as members of special instrument and process control systems, whether built by the end user or developed by a control system manufacturer. An example of the latter is the recent order from Foxboro for four PDP-4's and two PDP-5's for use with Foxboro's Model 97600 and 97600 process control systems. This sales success just adds to the bright growth picture which DEC has been able to achieve in the six years since its founding in 1958. For example sales have increased from $2,657,643 in 1961 to $9,903,000 in 1963, and are expected to be over $14,000,000 in 1964. American Research and Development Corp. made an investment of $70,000 in 1958 to acquire what is today 69% of the outstanding stock of DEC. (The rest is owned principally by officers of DEC.) Today, AR&D lists the value of this holding as $7,000,000 an increase of 1000% in six years!

The future continues to look promising for DEC and there has been considerable speculation about the possibility of a public offering of DEC stock. Although DEC President Ken Olsen has publicly expressed several times a distaste for selling stock to the public, we have learned that the company is preparing to publish publicly for the first time an annual report which should be available by mid-October. This suggests that those who are anxious to invest in DEC may well have an opportunity to do so by mid-1965.

DIGITAL ELECTRONICS ENTERS COMPUTER FIELD WITH DIGIAC 3080

A new name has joined the ranks of general purpose computer manufacturers. It is Digital Electronics, Inc.,of Westbury, N.Y. which has

announced the Digiac 3080, a computer featuring a magnetic drum memory and selling for under $15,000. The computer is principally designed as a training device for high schools and colleges, although it may find some application in process control, machine tool control, and special-purpose test equipment where its relatively slow operating speeds (add time is 1.5 msec.) would not prove a limitation. Input/Output is by typewriter or paper tape. Memory size is from 1K to 4K 27-bit words. A modified FORTRAN compiler will be available.

The Digiac 3080 joins a line of electronic products developed by Digital Electronics for the educational field with emphasis on teaching digital logic techniques, computer maintenance, and programming. The company itself was formed in 1961 by Dr. Samuel Lubkin, a well-respected pioneer in the computer field (he was engineer-in-charge of Aberdeen Proving Ground at the time the first automatic electronic computer, the ENIAC, was installed). Subsequently joining Dr. Lubkin was George Wulfing, formerly Vice President of CEIR. Lubkin now serves as Board Chairman of the firm, while Wulfing is President.

Although the Digiac 3080 appears to be a very sensibly designed machine for the educational market (current estimates are that there are about 600 computers in high schools, colleges and universities being used for training purposes some share of the time), it is likely to run into stiff competition from second generation computers such as the control data 160/160A and the IBM 1620 which are becoming available as used computers at substantially reduced prices...and in many cases, if a ready buyer is not found for the equipment, such machines are donated to schools to gain a tax saving for the manufacturer who has not yet completely depreciated the value of the machine.

QUANTITY & VALUE OF SHIPMENTS OF COMPUTERS AND ASSOCIATED DATA PROCESSING MACHINES: 1963 & 1962

Product	Shipments					
	1963			1962		
	Number of Units	Value ($1,000) F.o.b. plant	Value ($1,000) Retail list price (exclusive of excise tax)	Number of units	Value ($1,000) F.o.b. plant	Value ($1,000) Retail list price (exclusive of excise tax)
Electronic computing and associated information processing equipment, total[1]	(NA)	860,065	930,154	(NA)	685,857	709,519
Digital:						
General Purpose[2]	7,533	755,640	824,836	8,038	544,475	567,698
All other	(NA)	68,949	69,072	(NA)	120,542	120,542
Analog[2]	640	35,656	36,246	472	20,840	21,279

[1]Figures include in some cases the value of leased machines as well as the value of machines sold outright.
[2]Represents the number of complete systems.

The 1963 data were collected on Census Form MA-35R, "Office, Computing, and Accounting Machines," and include reports from 211 establishments which manufacture business machines. The figures on quantity and value of ship-

ments represent physical shipments from the reporting establishments and include products shipped on consignment. The value of shipments f.o.b. plant excludes discounts and allowances, freight charges, and excise taxes.

In the case of products not sold but leased, the establishments reported an estimate of their value. These estimates approximate the value of the products if sold outright, and are based on the valuation placed on them for tax, insurance, or similar purposes.

Any inquiries concerning these data should be addressed to the U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington 25, D.C.

IBM PRICE REDUCTIONS IN SECONDARY SHIFT RENTALS VIEWED AS EFFECT OF INCREASED REVENUES FROM METER PLAN

IBM has recently announced it would reduce 2nd and 3rd shift computer rentals from 40% to 30% of the rental for the primary shift (primary shift is 176 hours per month). This new arrangement was made retroactive to July 1, which conveniently predates the announcement by General Electric of its "unlimited use clause" on their computer rental contracts (this affords a user of, for example, GE's 635 computer unlimited use of the computer for a fixed monthly rental).

The economic justification for this reduction in 2nd and 3rd shift rentals is not so much a reaction to GE's competitive move as it is a reflection of the increased revenues coming to IBM since the installation of time recording meters on all their rented computers several months ago.

The motivation for IBM's installing time meters was the well-publicized GSA investigation of last year when IBM had to repay NASA well over a million dollars in machine rentals when it could not produce adequate records to show that the machine time paid for was actually used. To avoid similar disputes, IBM decided to install usage meters on each piece of computer equipment installed, including major peripheral units such as printers, tape transports, card R/P, etc.

A survey of a number of computer users in the past month indicates that IBM is achieving between 10%-20% increased rental from a typical computer installation as a result of the meter plan. The reason for this being that traditionally computer use records have been frequently kept very sketchily, with many users willing to pay for one shift operation, but unwilling to record conscientiously computer usage that edges over into second or third shift time. The new meters do not suffer from such inconsistency...they record the actual time used on each unit in the computer system. During maintenance work, a key is used to switch to a secondary meter to record maintenance time.

The IBM meter plan seems very fair, but still suffers from some inequities. These arise because the time meter is designed to be set into operation by specific instructions. For example, when a line is printed on the printer, the meter on the printer is put into operation. The meter will continue to operate until the computer encounters a programmed halt or is stopped from the console. When a utility program such as a "sort" program is used, one of the first operations performed by the program is

to print out an image of the control cards used as a permanent record of that data. This printout turns on the printer meter. There might not be more printout required for hours since sort operations can take huge chunks of machine time... yet the printer meter continues to run until the central processing operation is halted. In such a case the time elapsed on the meter is a very poor measure of effective usage.

Since IBM apparently did receive an immediate increase in rental revenue when the time meters went into operation, it would appear that the recent reductions in 2nd and 3rd shift rental rates only serve to offset some of this income increase. However, the move does offer on paper an attractive competitive sales point for IBM by producing a relative reduction in secondary shift rental costs of the unrestricted computer use arrangement now being offered by GE and currently being considered by other manufacturers.

NOTES FROM THE EDITOR'S SCRATCHPAD

*NEW RANDOM-ACCESS MEMORY UNITS will be introduced by three manufacturers in the coming weeks. The first is a cartridge loading storage device using continuous loops of computer tape as the basic storage element. It is about to be officially introduced by Potter Instrument. (Readers may remember that we commented favorably on the potential performance and market for this unit in our April 30th issue.) Called the Potter RAM, the unit offers a storage capacity in excess of 50 million bits per cartridge with an average access time under 90 msec....making it up to 50% faster than presently used disc files, disc packs, and magnetic card systems. Pricing on the system is also attractive. The control unit goes for $15,000 to $18,000...with individual cartridges available for about $200. First delivery is expected in March, 1965.

The second random-access unit is a read-only photo-optical disc storage system being developed by Itek. This unit will offer up to 10 billion characters of information with access times believed to be as low as 200 msecs. The unit uses an electronic beam to scan a circular film which has clear and opague areas corresponding to bit configurations of characters stored on the film. Reading is accomplished by means of photosensitive detectors behind the film.

The price for the memory unit is expected to be between $500,000 and $750,000, with new discs being developed for users on a service bureau basis at a nominal cost. Main applications are expected in language translation, and in scientific/engineering computing where access to large table of numerical or literal values on an on-line basis is highly desirable.

The third new mass memory unit will offer to independent computer manufacturers a unit similar to the bulk core storage device featured by IBM for the System/360, but not made by any other computer manufacturer. It is a core storage unit which provides 18.9 million bits of storage arranged in 64 plains, each 60" by 13". The 8 usec. access time unit (same speed as IBM's) is being introduced by Fabri-Tek during the last week of October.

*IBM Chairman T.J. Watson, Jr.'s recent estimate of the cost of automatic data processing (equipment, supplies, personnel and services) in the U.S. in 1964: $5.4 billion.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

July 27 - August 7, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	605	48 1/4	43 5/8	43 5/8	-4 5/8	-9.59
American R & D	27	18 1/4	72	20 3/8	19 3/8	19 3/4	-1/2	-2.47
Burroughs	27 1/4	22 1/8	724	26 1/2	23 1/8	24	-2 5/8	-9.86
Control Data	111 7/8	74 1/4	1607	94	85 1/8	87 3/4	-1 3/8	-1.54
Electronic Associates	27 3/8	20 1/4	465	21 7/8	20 1/4	21 3/8	-3/8	-1.72
General Dynamics	32 5/8	23 1/2	4105	32 5/8	29 1/4	31 5/8	+1 3/8	+4.55
General Electric	90 5/8	73 3/4	1836	85 1/8	81 3/4	82 3/4	-2	-2.36
General Precision	32 3/8	25 1/2	228	28 3/8	26 3/4	27 5/8	-3/4	-2.64
Honeywell	148 3/4	115 1/4	550	132	123 1/4	128 1/4	-2 3/4	-2.10
IBM	494	442	907	465	442	449	-14 3/4	-3.18
Inter. Tel. and Tel.	60	52 5/8	467	55 1/4	53 3/4	54 3/8	-3/8	-0.68
Litton Industries	79 5/8	58 1/4	688	66 5/8	61 3/4	63 7/8	-2	-3.04
Nat. Cash Register	79 3/4	63	1094	76 1/4	72 5/8	75	-1/8	-0.17
Packard Bell	15 1/2	7	300	8	7 1/8	7 3/4	+5/8	+8.77
RCA	39 1/4	30	3629	33 1/8	31 1/4	31 3/4	-3/4	-2.31
Sperry Rand	21 3/4	14	2962	15 1/4	14	14 1/8	-7/8	-5.83
Xerox	122 3/8	70	3997	114 1/2	103	108	-7 1/4	-6.29
NYSE COMPUTER STOCK AVERAGE							-2.18	-2.38
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	401	28 3/8	23	27 1/2	+4 1/8	+17.65
Bunker-Ramo	13 5/8	7 5/8	350	9 5/8	8 1/4	8 1/2	-1 1/8	-11.69
Clary	7 1/2	5 1/4	69	6 3/8	6	6	-1/4	-4.00
Computer Sciences	29 5/8	15 3/8	134	18 7/8	16 5/8	17 7/8	+1 1/4	+7.52
Potter Instrument	12 1/4	6	34	6 3/8	6	6 1/4	------	-----
AMEX COMPUTER STOCK AVERAGE							+0.80	+1.90

	1964 High Bid	1964 Low Bid	August 7 Bid	August 7 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	12 1/4	13 1/4	14
Computer Control	19 5/8	12 3/4	15 3/8	16 5/8	16 5/8
Data Products	8 1/8	3 1/8	3 3/8	3 7/8	3 1/2
Digitronics	20	8 7/8	9	10	9 1/2
Dura Corp.	28 1/2	23 7/8	25 1/4	27 1/4	26 7/8

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October 27, 1964 Vol. 1, No. 11
(File Date: August 30, 1964)

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM FINDS SALES SLOW IN HIGHER END OF SYSTEM/360; INTRODUCES "EMULATORS" TO ACHIEVE COMPATIBILITY WITH EXISTING SYSTEMS

The results of sales of System/360 in the first three months following its announcement last April have apparently provided a startling eye-opener for IBM. During that time, the Models 30 and 40, the only computers which offered a compatibility feature with existing IBM equipment, accounted for nearly 90% of the computer system sales by number, and nearly 70% on a gross value basis. (The model 30 has an optional read-only memory which enables it to run instructions written for 1401, 1440 or 1460 computers. The model 40 uses a similar device to run 1401 or 1460 instructions.)

The table below reflects the number and value of System/360 orders booked as of mid-year in IBM's Eastern Region (the Eastern Region includes 18 Atlantic Coastal states. This region is estimated to account for approximately 40% of IBM's domestic computer sales and about one-third of world-wide sales). The figures in the table were gathered from unofficial but reliable sources.

SYSTEM/360 SALES AS OF 6/30/64 - EASTERN REGION

	Number of Systems Ordered		Average Rental		
Model	Units	% of Total	New System	Replaced System	% Rental Increase
360/30	615	73.4%	$ 8,195	$ 5,695	44%
360/40	144	17.2%	17,200	12,350	39%
360/50	59	7.0%	32,000	22,050	45%
360/60	5	.6%	54,200	38,800	39%
360/62	2	.2%	58,000	68,500	-14%
360/70	13	1.6%	79,400	50,300	38%
Total:	838	100.0%			

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The importance of the 1400 compatibility feature in model 30 sales is indicated by the fact that 65% of the model 30 orders include the $225 a month extra feature. 15% of the model 30 orders are for 8K memories, 37% for 16K memories, 31% for 32K memories, and 17% for 65K memories. Interestingly, 64% of the systems have at least one disc pack drive on order...a piece of peripheral equipment not being currently produced by other manufacturers.

A number of factors account in part for the poor sales showing for the models 50, 60, 62, and 70 in the table. One is that large system orders are generally preceded by a longer systems planning and deliberation period than those for small systems. Another is that some of the best prospects for the larger System/360 models are located within the Federal Government and among the West Coast aircraft industry and defense contractors... market areas not covered in the table. However we feel that the most important reason by far for the relatively poor acceptance of these machines has been the lack of provision of aiding a 7000 series customer in keeping his jobs running during the programming conversion period to System/360.

Realizing this marketing problem, IBM accelerated its program for the development of hardware and software techniques to allow current 7000 series customers to run existing programs on System/360. Last week IBM was able to announce that a combination of read-only memory and programming techniques, called emulators, will be available to enable System/360 units to run programs written for the 7010, 7040, 7044, 7070, 7074, 7080, 7090, 7094, 7094II, 709 and 1410 computers. What is of particular significance about the announcement is that the emulators for most machines are only available on model 50, 60, and 62 units...three of the most sluggish computers in sales. The emulators just announced allow:

- Emulation of 1410/7010 programs on models 40 or 50
- Emulation of 7070 programs on model 50
- Emulation of 7070/7074, 709, 7040, 7044, 7090, 7094, and 7094II programs on model 60 and 62
- Emulation of 7080 programs on model 62

By focusing the availability of emulators on particular machine models, IBM not only increases the sales of particular machines but also effectively steers its current customers into ordering systems that achieve a significant increase in rental revenues when the new system is installed. We understand that IBM is shooting for an average rental income increase of 40% when System/360 units are installed to replace installations used by current customers. From the information in the table, they seem on target for most systems.

The use of the emulator technique lessens, but does not eliminate, the urgency of reprogramming major jobs into System/360 instructions. This is because the emulator can take only partial advantage of the increased speed of System/360 since it requires the machine to execute several additional logic steps in order to compose and execute machine instructions that are similar to those of the machine for which the programs were originally written. For example, the model 62 is approximately

six and a half times faster in executing arithmetic instructions than the 7080, but when 7080 programs are run on the model 62, they take twice as long to execute...and the model 62 is typically 15% more expensive than the 7080.

In the case of the model 70, considered by IBM the natural replacement choice of 7090/94 users, the reasons for slow sales have been several. Certainly one reason is the lack of program compatibility with current equipment. Another is a considerable amount of hesitant skepticism about IBM's New Programming Language (tentatively called SPECTRUM). This new language has been developed to extend the features of FORTRAN to include extensive I/O operations, string manipulation, and dynamic response to trap conditions. By doing so, it is hoped that business-type problems can also be effectively programmed, and the needs of programming for time-sharing and multi-processing systems can be accommodated. However, at recent professional society meetings SPECTRUM has been criticized for being a "rush language" and one that was designed by a committee to include all the "whistles and bells" that the committee wanted...but the process resulted in a language that "only IBM can afford to implement".

To become a programming language of general acceptance, SPECTRUM will have to prove itself capable of implementation on a variety of machines. The Bell Laboratories is developing a compiler for SPECTRUM on their 7094 which should be ready by early 1965...it will provide the first opportunity to test the effectiveness of the new language. IBM is developing SPECTRUM compilers for System/360 in England, but they are not expected to be available until late 1965. Although IBM will provide FORTRAN and COBOL compilers for System/360, no major extensions of these languages are planned...so IBM for the present is planning to put its full weight and prestige behind the acceptance of SPECTRUM. However, many prospective model 70 users are taking the "show me first" attitude...

...as well they can, for the competition in the large scale computer market is capable and aggressive. Control Data continues to do reasonably well with its 3600 and 3800 computers in this area, Univac is bidding with an impressively performing 1108, and General Electric has impressed many sophisticated users with its 600 series...and all these machines have a significant delivery advantage over the model 70. For the first time in many years it appears that IBM is threatened in a major market area... the market for large-scale computers for engineering and scientific applications. To counter, there is still a distinct chance that IBM will produce a hybrid circuit extension of the 7090 family, a 7095 or 7096, to offer a second choice to users of some 340 7090's.

EAI INTRODUCES ITS FIRST DIGITAL COMPUTER

Electronic Associates, long regarded as the IBM of the analog computer field (it has over 70% of the analog market), is expected to introduce its first major digital computer this week at the Fall Joint Computer Conference. The unit, designated the 4000, is designed primarily to serve as the digital component of EAI's Hydac series of hybrid computers. However, it will also be offered as an independent unit to systems builders. The 4000 is a 32-bit machine with a 5.5 usec. floating pt. multiply time. It is expected to have a price tag of $100,000 to $120,000. EAI has been purchasing the digital computer component of its Hydac computers from Computer Control Co.

Through EAI's subsidiary, Pacific Data Systems, EAI has been offering desk-size and rack-mounted digital computers for about nine months. PDS is not believed to be involved in the offering of this medium-scale digital computer, however.

EAI is also planning to introduce a new hybrid at the FJCC, labeled the 6000.

HONEYWELL CAPTURES SUBSTANTIAL GOVERNMENT ORDERS

Honeywell EDP is finally making substantial inroads in a market area which had substantially escaped its grasp in the past: the Federal Government.

At the beginning of this month the Air Force announced it had awarded a contract for eight H-800/H-200 systems for major Air Command Headquarters. The systems are to be installed by Sept. 1965. The annual rental from the systems will be $1.5 million. The contract includes an option on three additional systems.

This past week the Internal Revenue Service confirmed that it was ordering 10 H-200's to process individual tax returns at IRS regional service centers. Major components of the H-200 systems are being purchased by the IRS. Significantly, the H-200's are replacing 1401's used for similar jobs at the IRS.

Meanwhile, production on the H-200 continues at a good clip in Boston. Over 110 units will have been built by the end of October, with 72 scheduled for November, and 58 in December.

Sales of the H-200 may be given an added boost by the development of low cost random access memory devices such as Potter's RAM unit (see last issue) or Anelex's model 80 disc pack. Honeywell does offer the option of an IBM 1311 disc pack with the H-200 but is anxiously seeking another vendor for both competitive and pricing reasons. IBM has been claiming that the H-200 has never yet replaced an IBM computer that used a random access memory.

ASI DOUBLES COMPUTER LINE

Advanced Scientific Instruments has doubled its present line of computer products by announcing the first two members of its ADVANCE family of computers...the 6020 and 6040. The 6020 is a small-scale system priced at $79,000 and the 6040 is a higher-performance unit priced at $104,000. The machines are upward compatible in hardware and software, and offer operating speeds which are competitive with recently introduced machines from SDS, DEC, and Computer Control.

Customers for ASI's existing 210 and 2100 computer systems have indicated substantial satisfaction with the effectiveness of these computers... over 30% have ordered additional ASI computer systems.

BEMA FIGURES SEE ROSY GROWTH FOR BUSINESS EQUIPMENT INDUSTRY

Various business predictions and statistics rendered by officials of the Business Equipment Manufacturers Association (BEMA) at their meeting in Los Angeles this past week included:

- The business equipment industry is now the fastest growing in America, with an annual growth of more than 15% a year. The EDP growth rate within this group is put at 30% annually.

- Annual shipments of office equipment, office machines, and data processing systems, expected to be about $5 billion this year, will reach $10 billion by 1970.

- Value of installed computer systems by the end of 1964 will be in excess of $6 billion, up $2 billion from 1963. This will represent over 22,000 computer systems installed.

- Over 28,500 computer systems are expected to be installed by the end of 1965 for a total installation value of over $8 billion.

A NATIONAL COMPUTER CENTER

An interesting step toward the establishment of a national computer center for the use of scientists and engineers is being made at the Carnegie Institute of Technology. Under a $3 million contract from the Advanced Research Projects Agency of the Department of Defense, CIT is setting up this fall a Center for the Study of Information Processing.

The Center will use a couple of CDC G-20 computers with the second largest memory storage capacity of any computer in the U.S. By early 1965, a total of five computers will be used for the Center's work.

The use of the Center is being visualized on a "public utility" basis where any qualified user in the U.S. can solve problems on the Center's computer facilities by operating a remote terminal connected by telephone lines with the CIT-based installation. Twelve remote terminals are already operating with the computer at CIT, and it is expected that by the end of the year the number of campus-based units will increase to thirty.

This development adds another measure of weight to the arguments of those who predict that a substantial portion of the engineering/scientific calculations done by computers in this country in 1970 will be via such multi-station, computer time-sharing systems (see issue of July 15th for further comment).

RCA CHAIRMAN URGES END OF TECHNICAL INCOMPATIBILITY BETWEEN COMPUTERS

As though setting the philosophical background for RCA's upcoming announcement of a series of computers compatible with System/360, RCA Chairman Sarnoff tells the Fall Joint Computer Conference this week that incompatibility among computers has resulted in"needless duplication, delay, and waste -- both to the manufacturer and to the user -- in cost, in equipment, in operating efficiency, and in manpower and skills."

Sarnoff continues "...new generations of data systems are coming, and the time to bring order into progress is now, before they have fully arrived. Standards can be established which, if planned with thought and foresight, can guide us in the future, linking our separate efforts and facilitating the common evolution of our industry."

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF AUGUST 29, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	20	2
	ASI 2100	Y	$3000	12/63	5	2
Autonetics	RECOMP II	Y	$2495	11/58	66	X
	RECOMP III	Y	$1495	6/61	21	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	11	3
	RW-300	Y	$5000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$7000	12/63	9	17
	TRW-530	Y	$6000	8/61	22	4
Burroughs	205	N	$4600	1/54	62	X
	220	N	$14,000	10/58	42	X
	E101-103	N	$875	1/56	125	X
	E2100	Y	$535	8/64	6	1000
	B100	Y	$2800	8/64	6	32
	B250	Y	$4200	11/61	91	18
	B260	Y	$3750	11/62	64	173
	B270	Y	$7000	7/62	82	30
	B280	Y	$6500	7/62	89	42
	B370	Y	$8400	7/65	0	16
	B5000	Y	$16,200	3/63	34	24
	B5500	Y	$35,000	3/65	0	1
Clary	DE-60/DE-60M	Y	$525	2/60	235	5
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	35	21
	DDP-116	Y	$900	2/65	0	0
	DDP-224	Y	$3300	12/64	0	5
Control Data Corporation	G-15	N	$1000	7/55	320	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/160G	Y	$1750/$3500/$12,000	5/60;7/61;3/64	376	27
	924/924A	Y	$11,000	8/61	28	3
	1604/1604A	Y	$38,000	1/60	60	X
	3200	Y	$12,000	5/64	11	61
	3400	Y	$25,000	11/64	0	18
	3600	Y	$58,000	6/63	24	33
	6600	Y	$110,000	8/64	1	3
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	54	2
	PDP-4	Y	Sold only about $60,000	8/62	42	10
	PDP-5	Y	Sold only about $25,000	9/63	55	10
	PDP-6	Y	Sold only about $300,000	8/64	1	8
	PDP-7	Y	Sold only about $72,000	10/64	0	10
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	$600	6/63	152	171
General Electric	205	Y	$2900	9/64	0	10
	210	Y	$16,000	7/59	60	X
	215	Y	$5500	11/63	24	14
	225	Y	$7000	1/61	119	3
	235	Y	$10,900	12/63	18	18
	415	Y	$5500	5/64	10	105
	425	Y	$7500	7/64	3	46
	435	Y	$12,000	10/64	0	20
	455	Y	$18,000	6/65	0	9
	465	Y	$24,000	6/65	0	6
	625	Y	$65,000	2/65	0	7
	635	Y	$50,000	12/64	0	7
General Precision	LGP-21	Y	$725	12/62	122	56
	LGP-30	semi	$1300	9/56	435	5
	RPC-4000	Y	$1875	1/61	100	2
Honeywell Electronic Data Processing	H-200	Y	$4800	3/64	43	610
	H-300	Y	$3900	7/65	0	5
	H-400	Y	$5000	12/61	99	10
	H-800	Y	$22,000	12/60	62	7
	H-1400	Y	$14,000	1/64	8	6

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
	H-1800	Y	$30,000	1/64	4	7
	H-2200	Y	$11,000	10/65	0	11
	DATAmatic 1000	N	---	12/57	5	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	3
IBM	305	N	$3600	12/57	515	X
	360/30	Y	$8000	7/65	0	1875
	360/40	Y	$17,000	7/65	0	600
	360/50	Y	$32,000	9/65	0	300
	360/60	Y	$54,000	10/65	0	60
	360/62	Y	$58,000	11/65	0	30
	360/70	Y	$80,000	10/65	0	150
	650-card	N	$4000	11/54	390	X
	650-RAMAC	N	$9000	11/54	76	X
	1401	Y	$5200	9/60	7350	600
	1401-G	Y	$1900	5/64	190	800
	1410	Y	$12,000	11/61	425	150
	1440	Y	$1800	4/63	950	500
	1460	Y	$9800	10/63	600	700
	1620 I, II	Y	$2500	9/60	1500	28
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	49	39
	702	N	$6900	2/55	3	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	42	X
	7040	Y	$14,000	6/63	52	40
	7044	Y	$26,000	6/63	40	15
	705	N	$30,000	11/55	84	X
	7070, 2, 4	Y	$24,000	3/60	520	38
	7080	Y	$55,000	8/61	70	3
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	50	4
	7094	Y	$70,000	9/62	254	25
	7094 II	Y	$76,000	4/64	42	56
ITT	7300 ADX	Y	$18,000	7/62	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	158	X
	Monrobot XI	Y	$700	12/60	405	188
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	220	128
	NCR - 390	Y	$1850	5/61	660	188
Packard Bell	PB 250	Y	$1200	12/60	155	8
	PB 440	Y	$3500	3/64	4	8
Philco	1000	Y	$7010	6/63	15	0
	2000-212	Y	$52,000	1/63	5	2
	-210,211	Y	$40,000	10/58	19	2
Radio Corp. of America	Bizmac	N		-/56	3	X
	RCA 301	Y	$6000	2/61	505	140
	RCA 3301	Y	$11,500	7/64	2	31
	RCA 501	Y	$14,000	6/59	96	4
	RCA 601	Y	$35,000	11/62	4	1
Scientific Data Systems Inc.	SDS-92	Y	$900	12/64	0	1
	SDS-910	Y	$2000	8/62	75	58
	SDS-920	Y	$2700	9/62	58	8
	SDS-925	Y	$2500	12/64	0	1
	SDS-930	Y	$4000	6/64	4	23
	SDS-9300	Y	$7000	10/64	0	5
UNIVAC	I & II	N	$25,000	3/51 & 11/57	32	X
	III	Y	$20,000	8/62	75	37
	File Computers	N	$15,000	8/56	24	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	338	1
	Solid-State II	Y	$8500	9/62	43	3
	418	Y	$11,000	6/63	6	8
	490	Y	$26,000	12/61	35	21
	1004	Y	$1900	2/63	1800	775
	1050	Y	$8000	9/63	66	250
	1100 Series (except 1107)	N	$35,000	12/50	14	X
	1107	Y	$45,000	10/62	20	7
	LARC	Y	$135,000	5/60	2	X
	1108	Y	$50,000	7/65	0	8
				TOTALS	21,542	10,645

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

August 10 - August 28, 1964

	1964 High	1964 Low	3 weeks Sales In 100s	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	612	45 1/2	42 1/2	43	-5/8	-1.43
American R & D	27	18 1/4	136	20	18 1/2	18 1/2	-1 1/4	-6.33
Burroughs	27 1/4	22 1/8	1439	26 3/4	24 1/4	26 1/8	+2 1/8	+8.85
Control Data	111 7/8	74 1/4	1746	91 3/8	80 5/8	83	-4 3/4	-5.41
Electronic Associates	27 3/8	20 1/8	358	21 7/8	20 1/8	20 5/8	-3/4	-3.51
General Dynamics	33 1/4	23 1/2	3192	33 1/4	29 3/4	33	+1 3/8	+4.35
General Electric	90 5/8	78 3/4	2616	84 5/8	81	84 1/8	+1 3/8	+1.66
General Precision	32 3/8	25 1/2	572	29	27	28 5/8	+1	+3.62
Honeywell	148 3/4	115 1/4	437	131 5/8	123 3/4	124 1/2	-3 3/4	-2.92
IBM	494	425 1/2	1244	453 1/2	425 1/2	437 3/4	-11 1/4	-2.51
Inter. Tel. and Tel.	60	52 5/8	599	55 1/2	53 5/8	53 5/8	-3/4	-1.38
Litton Industries	79 5/8	58 1/4	1142	69 3/8	64	68 1/2	+4 5/8	+7.24
Nat. Cash Register	81 3/8	63	1014	81 3/8	74 3/4	81	+6	+8.00
Packard Bell	15 1/2	7	1048	10	7 3/4	9 1/8	+1 3/8	+17.74
RCA	39 1/4	30	5663	32	30 1/8	31 3/4	-----	-----
Sperry Rand	21 3/4	12 3/4	5644	14 1/4	12 3/4	13 1/2	-5/8	-4.42
Xerox	122 3/8	70	3589	112 3/8	98 1/8	101 1/2	-6 1/2	-6.02
NYSE COMPUTER STOCK AVERAGE							-0.72	+1.03
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	343	29 1/2	26 1/2	27	-1/2	-1.82
Bunker-Ramo	13 5/8	7 3/8	667	9 1/4	7 3/8	7 3/4	-3/4	-8.82
Clary	7 1/2	5 1/4	83	6 3/8	5 3/8	5 1/2	-1/2	-8.33
Computer Sciences	29 5/8	15 3/8	128	18 1/4	17	18	+1/8	+0.70
Potter Instrument	12 1/4	6	93	7 1/2	6	7 1/2	+1 1/4	+20.00
AMEX COMPUTER STOCK AVERAGE							-0.08	+0.35

	1964 High Bid	1964 Low Bid	August 28 Bid	August 28 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	11 3/8	12 1/4	12 1/4
Computer Control	19 5/8	12 3/4	14 1/2	15 1/2	15 3/8
Data Products	8 1/8	3 1/8	3 1/8	3 5/8	3 3/8
Digitronics	20	7 7/8	7 7/8	8 3/4	9
Dura Corp.	28 1/2	23 7/8	27 1/4	29	25 1/4

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November 30, 1964 Vol. 1, No. 12

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

COMPUTER INDUSTRY WILL BE A $5 BILLION A YEAR BUSINESS BY 1970 WITH OVER $17 BILLION IN COMPUTERS INSTALLED SPEAKERS PREDICT AT SEMINAR

"Prediction is difficult, especially when dealing with the future"... Danish Proverb

Unmindful of Danish folk wisdom, your editor, joined by Dick H. Brandon, President of Brandon Applied Systems, Inc., a data processing consulting firm, voiced a series of predictions on the growth of the computer industry to 1970 at an all-day briefing session on the computer industry for security analysts held recently in New York.

Prime among the estimates was that the value of commercial computers installed in the United States would increase from $6.4 billion in 1964 to over $17 billion in 1970.

Your editor also predicted that the number of computers installed in the U.S. would increase from 18,000 at the end of this year to nearly 60,000 by 1970, and that over 50% of the computers installed in 1970 will rent for under $5000 a month. The computer industry itself was forecasted to be a $5 billion a year business by 1970 with total expenditures for data processing, including equipment, programming, personnel, supplies, consulting services, etc. approaching $13 billion a year. To be noted is that these predictions were based on the value of the 1964 dollar.

Mr. Brandon outlined the shares of the market for computer manufacturers in 1964, stating that IBM is on top with 78 to 80 per cent of the market, followed by the Univac division of Sperry Rand with an estimated 7.5 per cent. Others were given as Control Data Corp. (2.8 per cent); Radio Corp. of America (2.4 per cent); Honeywell (2.2 per cent); General Electric (2.0 per cent); and Burroughs and National Cash Register with 1.5 per cent each.

In 1970 the speakers predicted that IBM will still be on top by a wide margin, although its share of the market will have dropped to 70 per cent. General Electric will be in second position with 8 to 10 per cent of the market, followed by Univac and Control Data with 5 to 7 per cent each, and Honeywell and RCA with 4 to 5 per cent each.

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The speakers saw firms such as Burroughs and National Cash Register becoming specialists in developing complex peripheral equipment for data processing, many of the devices incorporating small general purpose computers in their construction. Their use would be in fields such as image storage and retrieval, data collection and transmission, and optical character recognition.

Trends expected in the computer field as outlined by your editor and Mr. Brandon include:

1. The increasing shift toward program compatibility between computers of competing manufacturers, with the command structure of IBM's new System/360 being adopted as the de facto standard.

2. The elimination of much of the $2.5 billion worth of punched card and tabulating equipment with its replacement by low cost computers and newly developed forms of data capture devices that convert data directly into a form which can be processed by a computer.

3. A strengthening in the market for general purpose computers in the process instrumentation field where such firms as Computer Control Co., Digital Equipment Corp., Raytheon Corp., and Scientific Data Systems can provide productive computers at a low cost because they need not spend the heavy programming and marketing expenses required of the other computer manufacturers.

4. A lightening of the shortage of computer programming and systems personnel as the growth of programming compatibility between computers allows more and more standard application programming packages to be available to the majority of users.

Included in the briefing session on the computer industry was a review of the growth of the computer field, an analysis of the market for computer equipment and services, and a detailed description of the market and technical position of the principal firms in the computer field. The session, held at the Lawyers' Club in New York, was attended by over 40 security analysts and institutional investors. It was the first in a series of semi-annual briefing sessions sponsored by the EDP Industry and Market Report for the financial industry.

A detailed report, summarizing the subjects discussed at the session and providing expanded presentations of the statistical information on markets and companies, is being sent to each participant. Extra copies of this report are available from our offices for $95 each.

BUNKER-RAMO TO USE 3C COMPUTERS IN PROCESS SYSTEMS

Bunker-Ramo Corp. has just completed arrangements with Computer Control Co. for the use of 3C computer hardware and technology on a world-wide basis.

This arrangement in effect will enable Bunker-Ramo to use 3C computers in B-R's process control systems, an application area where B-R supplies by itself, or through its affiliates, over 20% of the computer-based process control systems used in the world.

B-R's immediate interest is in 3C's recently announced DDP-116, a 16-bit, 1.7 usec. memory cycle computer with a price tag beginning at $29,000. B-R will market this unit in the BR335 system as a small computer for process and manufacturing control operations. B-R is said to have no current plans to use 3C's DDP-24 or DDP-224 computers in process systems under the B-R brand.

In one sense, this arrangement closely parallels the agreement between Digital Equipment and Foxboro, whereby Foxboro installs small and medium-scale DEC computers in its process systems. However, unlike Foxboro, B-R has been manufacturing its own line of digital computers for process systems... in fact, it made the industry's first installation of a computer-based process control system in 1959. However, B-R has been experiencing heavy losses since its creation from the computer group of TRW and its combination with the Teleregister Corp. this past July. As President Ramo observed in his most recent quarterly report, B-R is trying to become a forceful factor in the electronic on-line, real-time systems industry, and "in the early stage of this program we are shouldering the burden of many 'start-up' costs." Apparently the development of a small digital computer is one of the start-up costs which B-R has decided not to carry neck-high.

The first DDP-116's are expected to be delivered to Bunker-Ramo by April, 1965.

GERMAN CHEMICAL FIRM BUYS U.S. COMPUTER TAPE MAKER

Independent European manufacturers in the computer field have become a vanishing breed of late. A contributing factor has been the huge share of the market controlled by U.S. manufacturers, and increased U.S. ownership of European computer makers, such as the recent GE arrangements with Bull of France, and Olivetti of Italy.

This move into foreign markets in the computer field is a reversible one, however, as indicated by the recent purchase of Computron, Inc., one of the four leading U.S. manufacturers of magnetic computer tape, by Badische Anilin- & Soda-Fabrik Aktiengesellschaft (BASF), a prominent West German producer of dyestuffs, chemicals and plastics, The latter firm also produced the first magnetic recording tape in 1934. Computron will function as a wholly-owned subsidiary of the BASF-Group, under the present management.

According to our estimates, Computron has about 5% of the $30 million a year domestic market for magnetic computer tape. The new owners will bring advanced technical competence to Computron; and it is likely that the firm will expand into the production of magnetic coatings for such devices as disc files, cards, etc. and other mass memory devices.

RAYTHEON COMPUTER ACQUIRES MEMORY OPERATIONS OF PHILCO DIVISION

Raytheon Computer adds to both its product line and its advanced memory development by its recent acquisition of the Biax Memory Products group of Philco Corp.'s Aeronutronic Division. Annual sales of the Biax Memory Products operation is about $1 million. Philco is a wholly-owned subsidiary of Ford Motor Co.

The Biax unit is a high-density read-only memory with a cycle time as short as .1 usec. Packing densities of 2000 bits per cubic inch have been achieved using the Biax two wire memory technique. Cost of current units range from 35 to 45 cents per bit, and economics have concentrated their use aboard spacecraft and satellites.

The acquisition move was stimulated by Joseph Ricca, who was head of the Biax group before leaving a few months ago to become the new head of the Raytheon Computer operation in Santa Ana, Calif.

Raytheon will acquire the equipment and the "know-how" for the entire Biax operation, from the making of basic iron powder, forming the elements, firing them, wiring into arrays, and the test operation. They will skim off the cream of the key technical people, hiring about two dozen of the 30-50 people in that category working with the Biax group at Aeronutronic. The acquisition does not include the thin film memory research also going on at Aeronutronic.

The deal will give Raytheon Computer not only a "solid memory capability" for external sales, but also for the possible incorporation of the memory systems in elements of their own computer line destined for military and space applications.

GE CAPTURES BELL LABS ORDER FOR LARGE COMPUTER TO REPLACE IBM 7094

General Electric added an important notch on its barrel recently in its efforts to rifle away an increased share of the large-scale computer market when it landed an order for a 635 system from the Bell Telephone Laboratories. The order represents the second prestigious institution which has given GE the nod over IBM for a new large computer for real-time and time-shared system operations...the first being the recent Project MAC order for a 635 at MIT.

The 635 will replace an IBM 7094 currently being used at Bell Labs. The 635, leasing for approximately $60,000 a month, is to be installed in November, 1965.

There are two other 7094's currently being used at the Bell Labs, and our contact at the Labs has told us that an early decision was made not to run a split computer operation, so the possibility is very strong that the other 7094's will be replaced by GE equipment by the end of 1967.

Why the decision to go GE? The decision is significant because Bell Labs has been a solid IBM user, currently running 3 7094's, 4 1620's, and 13 1401's.

Our contact at the Bell Labs reports, "We are getting far more cooperation from GE in the development of special software for the new system than we got from IBM...however, negotiations are at the honeymoon stage right now; we have not rolled up our sleeves yet, so it is too early to

tell what will really develop. But we know that GE wants this order badly and we are not above squeezing them blue for the special software we need for the development of a time-shared computer system where we can have individual effective consoles at remote locations in the main labs and in branch locations. The 635 was chosen specifically because we felt it was designed to do this kind of job better."

One of the benefits that GE is gaining from the Project MAC order is the development of a software system for the 635 for time-sharing operations, so the Bell Labs' demands may be able to be met by GE without excessive development outlays.

COMPUTER SCIENCES PLANS ACQUISITION OF DOC., INC. AND PURCHASE OF TWO ITT SUBSIDIARIES

Computer Sciences stands to become the world's largest publicly-owned firm specializing in systems planning and data processing and retrieval services through its announced intention to acquire Documentation Inc., of Bethesda, Md., and its recent purchase of two subsidiaries of ITT.

The acquisition involves an exchange of 160,000 shares of CSC stock on a 3 for 1 basis with the holders of 480,000 outstanding shares of Documentation, Inc. The latter firm operates the technical information center for NASA and provides services in information storage, processing and retrieval. Doc., Inc. had net sales for the twenty-four weeks ending September 19 of $2,432,056, an increase of about 26% over the corresponding period last year. Nevertheless, CSC projects Doc., Inc.'s revenues at $6.5 million for the fiscal year ending next March 31. Earnings for fiscal 1964 were $106,996. The new acquisition is subject to the approval of the stockholders of both companies.

The ITT subsidiaries purchased by CSC are ITT Communication Systems, Inc., of Paramus, N.J., and ITT Intelcom, Inc., of Falls Chruch, Va. The purchase was for an undisclosed amount of cash...estimated to be about $2 million by several trade sources.

The two ITT subsidiaries were put on the block some time ago when ITT moved to avoid the possibility of a conflict of interest with the business of other ITT companies supplying military communications equipment to the U.S. government. The two purchased subsidiaries are primarily technical study groups which provide systems engineering and technical assistance to the government for ground and satellite communications...project areas where ITT prefers to be a hardware supplier. The combined revenue of both ITT subsidiaries for the six months ending last June 27 was $5,617,075; net was $154,966.

We wonder if CSC, a company which to our observation has a propensity for releasing flamboyant yet unrealized projections of their expected growth in sales and profits, knows what they are getting in the two ITT units. The CSC news release on the subject gives the employment at ITT Communication Systems at "over 400 scientists, management specialists and

systems engineers"...ITT's release sets total employment at 330 people. For Intelcom, Inc., CSC says there are "more than 150 staff members" while ITT's figure is 135.

We find it hard to imagine the alchemy by which CSC, which had a loss of $8,555 on revenues of $907,084 for the first quarter ended June 30, compared to a profit of $125,247 on revenues of $997,612 a year earlier, is planning to control a quadrupling of its staff and its sales base when its major capital asset is creative brainpower...a commodity with a remarkable dislike for management by remote control. Apparently undistracted by these considerations, CSC President Fletcher Jones estimates that total revenue for his company in the fiscal year ending next March 31, including the Documentation and ITT subsidiaries, will exceed $23 million. He added that total profit and per-share earnings would be "significantly higher" than a year ago and that any earnings projection made on the basis of the combined 1964 results of CSC and its new subsidiaries "would be far too conservative".

IBM INTRODUCES MODEL 20 UNIT; ANNOUNCES AGREEMENT ON OFFICE COPIER CONTRACT

In our April 30th issue we analyzed IBM's position in the small computer market, and predicted that "because of the anticipated order losses for machines (primarily the 1401-G and 1440) already in production or about to be installed, we feel that IBM will delay the model 20 announcement until late summer or early fall of this year, and schedule first deliveries on the model 20 for early 1966."

Essentially confirming our estimate, IBM introduced the model 20 officially in mid-November as a 3.6 usec. memory cycle computer with memory sizes ranging from 4K to 16K 8-bit characters, a minimum monthly rental of $1,280, and first deliveries scheduled in the first quarter of 1966. The model 20 uses the same hybrid circuitry of, and is program compatible with, other units of the System/360 series...however special I/O instructions require it to use a read-only memory to translate System/360 instructions for its own circuits.

Of course, key to the success of any small computer is in its peripherals, and IBM has announced with the 20 a new 2560 multi-function card machine which can do card-handling jobs that previously required four off-line machines: collating (merging and sequencing punched cards into a single deck), gangpunching (punching repetitive information, such as a date, in cards), reproducing (duplicating a deck of punched cards), listing (retrieving and printing information contained in punched cards), and summary punching (creating a card that summarizes data accumulated from many cards).

The 2560 reads up to 500 cards a minute, punches from 90 to 260 cards a minute, depending on the last column punched, and prints up to 100 cards a minute. Cards are read in from two separate card hoppers; they are discharged into five common output stackers to permit merging as well as sorting.

According to figures developed by IBM, a typical file maintenance job which would require four separate runs and take 183 minutes with accounting machines, requires two runs and 51 minutes with the 2560 linked

to a model 20 system. A billing job processing some 5,000 bills each cycle, would take nine separate punched card steps and seven hours of accounting machine time; with the new system it can be done in one step and take 2½ hours...i.e. the 20/2560 system is about three times as fast as equivalent tab equipment.

With the 2560 unit, a model 20 system begins at a rental of $1715 a month; a typical configuration of IBM 407 accounting machine, a card reproducer, sorter, collator and summary punch would rent for about $1100 a month...making the 20 about 65% more expensive than the equivalent tab installation compared above.

Besides its obvious application as a replacement for a tab installation, the model 20 can function as a terminal in a large data communication network. It can be linked by common carrier lines to a larger System/360 processor at a distant location. The 20 can then perform local data processing work and transmit and receive data as part of an overall business information system.

Compared to the smallest computers currently available from IBM, the 1401-G series, the model 20 offers several significant advantages. One is that memory for the 20 can be expanded to 16K characters, while 4K is tops for the 1401-G. Secondly, the card handling peripheral units originally announced with System/360 are available on the 20, including units reading cards at 1000 per minute and punching at 600 per minute. Top card handling speeds on the 1401-G series are reading at 450 a minute and punching at 250 per minute.

The organization outside of IBM likely to be most heavily effected by the market impact of the model 20 is Univac with over 2000 1004 punched card computers installed...mostly on lease with the first installation going in less than two years ago.

In our July 30th issue we carried a discussion of IBM's interest in the office copier field as a means of expanding their present line of office products as well as competing with the Xerox Corp., a potential competitor in the market for information systems for data storage and retrieval. Still in active pursuit of this field, IBM has announced an agreement with Harris Intertype and the Mead Corp. under which IBM obtains an option for a non-exclusive license under certain Harris electrophotographic developments and patent applications connected with office copying technology. If IBM exercises its option with Harris, and markets office copying equipment utilizing the Harris technology, the Mead Corporation will supply the copying paper. The Harris copying technique requires paper with a special coating. It is our estimate that IBM will announce a line of high volume office copying equipment by the spring of next year, with first deliveries scheduled shortly thereafter.

THINGS TO LOOK FOR...RCA's new computer series to be announced on December 8th will have four models equivalent to the model 20, 30, 50, and 70 of IBM's System/360 to which it is program compatible. Univac is setting to announce a 1010 computer which is a cross between the 1004 card processor and the 1050...they are also developing a line of System/360 compatible units for announcement in the spring.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

August 31 - September 11, 1964

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Control Data	111 7/8	74 1/4	751	88 1/2	81 1/8	83 1/8	+1/8	+0.15
Electronic Associates	27 3/8	20 1/8	253	21 3/4	20 1/8	21	+3/8	+1.82
General Dynamics	37	23 1/2	4296	37	32 1/2	36	+3	+9.09
General Electric	90 5/8	78 3/4	1702	88 1/2	83 5/8	88 1/4	+4 1/8	+4.90
General Precision	32 3/8	25 1/2	433	30 5/8	28 1/2	30 1/8	+1 1/2	+5.24
Honeywell	148 3/4	115 1/4	339	126 3/4	121	121 3/4	-2 /34	-2.21
IBM	494	425	871	446	425	425 1/4	-12 1/2	-2.86
Inter. Tel. & Tel.	60	52 5/8	676	57 1/2	53 1/2	56 3/8	+2 3/4	+5.13
Litton Industries	79 5/8	58 1/4	700	70 5/8	67	70 1/8	+1 5/8	+2.37
Nat. Cash Register	82 1/2	63	585	82 1/2	80	81 1/2	+1/2	+0.62
Packard Bell	15 1/2	7	268	10 1/2	8 7/8	10 1/4	+1 1/8	+12.33
RCA	39 1/4	30	3467	33 7/8	31 3/8	33 1/8	+1 3/8	+4.33
Sperry Rand	21 3/4	12 3/4	2723	14 1/2	13 1/2	13 3/4	+1/4	+1.85
Xerox	122 3/8	70	1751	107 7/8	99 3/8	106 1/2	+5	+4.93
NYSE COMPUTER STOCK AVERAGE							+0.71	+3.95
AMERICAN STOCK EXCHANGE								
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Bunker-Ramo	13 5/8	7 3/8	461	9 1/4	7 5/8	8 5/8	+7/8	+11.29
Clary	7 1/2	5 1/4	58	5 3/4	5 1/4	5 1/4	-1/4	-4.55
Computer Sciences	29 5/8	15 3/8	119	20	17 5/8	19 1/2	+1 1/2	+8.33
Potter Instrument	12 1/4	6	43	7 1/4	6 1/2	6 1/2	-1	-13.33
AMEX COMPUTER STOCK AVERAGE							+0.28	+0.53

	1964 High Bid	1964 Low Bid	Sept. 11 Bid	Sept. 11 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	10 5/8	11 1/2	11 3/8
Computer Control	19 5/8	12 3/4	15 1/4	16 3/8	14 1/2
Data Products	8 1/8	2 7/8	2 7/8	3 3/8	3 1/8
Digitronics	20	6 3/4	8	8 3/4	7 7/8
Dura Corp.	28 1/2	23 7/8	28 1/4	30 1/8	27 1/4

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P. J. McGovern, Editor
Telephone 617-332-8840

RCA'S SPECTRA 70 ANNOUNCEMENT SPOTLIGHTS SEVERAL MARKET STRATEGIES OF GROWING IMPORTANCE IN THE COMPUTER FIELD

RCA showed that it was a first-class electronics company, if not yet a front-runner in the office equipment field, with the announcement this month of its Spectra 70 computer series. The announcement also highlighted several of the most important computer marketing trends of the last year, viz.,

(1) Program Compatibility Among Competitive Computers
(2) Stress on Peripheral Equipment
(3) Use of Integrated Circuits
(4) Emphasis on Data Communication Systems
(5) Single-Fee Rental

Spectra 70 itself, as currently announced, consists of four processors, the 70/15, 70/25, 70/45, and 70/55. The two smaller models, the 15 and 25, use conventional circuitry, while the 45 and 55 are built with monolithic integrated circuits...making Spectra 70 the first major computer series to incorporate these third generation circuits as basic components.

The table below gives a summary profile of the characteristics of Spectra 70.

Characteristics \ Model	70/15	70/25	70/45	70/55
Word Size in Bytes (8 bits = 1 byte)	1	1	2	4
Main Memory Size (# of bytes)	4K-8K	16K-65K	16K-262K	65K-524K
Main Memory Cycle Time	2usec.	1.5usec.	1.44usec.	0.84usec.
Decimal Add Time A + B⟶C 5 digits	48usec.	28usec.	18usec.	6.6usec.
Typical Monthly Rental for Card System	$2600	$3800	$5600	N.A.
Typical Monthly Rental for Tape System	$4100	$5800	$9500	$14,300

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Price/Performance comparisons between competitive systems is an art replete with pitfalls...for the resulting figures can vary significantly depending on the equipment configuration and applications selected for comparison. However our best calculations to date indicate that the Spectra 70 offers a price/performance improvement of 50-60% in computation speeds and 30-35% in throughput speeds over corresponding models in IBM's System/360. A major reason for the drop in relative throughput advantage is that RCA does not offer the range of small to large capacity random access memory devices offered by IBM...slowing Spectra 70's relative performance on many file processing jobs with low activity ratios.

To offset this, RCA is planning to offer the popular IBM 2311 disk pack unit as an unencouraged option on a Spectra 70 system...especially unencouraged to customers for rented systems now that IBM will no longer make its peripheral equipment available on lease to other computer manufacturers (see story this issue). RCA is also sponsoring the development of its own disk pack unit at Bryant Computer Products, with prototypes available for delivery this winter.

Spectra 70 illustrates the five important market strategies outlined in the first paragraph in the following ways:

Program Compatibility: One of the largest potential expenses for an existing computer user in changing-over applications to a new computer system is the cost of rewriting existing programs in the language of the new computer. Since about 70% of new computer orders are now coming from existing computer users, it behoves the computer manufacturer to develop techniques which facilitate this program conversion to its own units from computers currently used by a generous share of its potential customers.

As is true in other computer families, Spectra 70 processors are program compatible in an upward direction. Spectra 70 also offers two methods of program compatibility with other systems...one, direct, and the other via microprogramming.

To achieve the direct compatibility with System/360, RCA designed Spectra 70 with the same data format and character codes as System/360 and incorporated the instruction repertoire of System/360, except for I/O instructions, in the command structure of the model 45 and 55, and subsets of it in the model 15 and 25. This means that after modifying I/O instructions through a special control program Spectra 70 should be able to run System/360 programs on a direct processing basis.

In the microprogrammed method, Spectra 70's model 45 can incorporate a read-only memory which converts instructions written for another computer into microprogrammed instructions understood by the 45...a technique identical to the "emulators" used by IBM in achieving compatibility between System/360 and 1400/7000 series computers. Currently one of four read-only memories can be chosen with the model 45 to convert programs from RCA's 301, 3301, 501 or IBM's 1401 computer.

Because the read-only memory method requires that each instruction be converted from one sequence of signals to another before execution, the efficiency of the resulting computer operation is reduced...sometimes by up to 1000%. The process is analogous to the reduction in efficiency of a business discussion when all words need to be translated into a foreign tongue. The read-only memory is also expensive to develop and fabricate...costing up to $150,000-$200,000 to develop and produce the first unit, while renting to the user for under $500/mo... so its development is usually justified only for computers of the broadest use... for example, no RCA 601 conversion memory is planned for Spectra 70.

The overwhelming advantage to Spectra 70 users of direct compatibility with System/360 is that the results of the huge investment in program development being put in by IBM and by leading IBM customers to support System/360 applications will also be available to them...provided that program copyright considerations don't prevent this annexing of creative effort.

Stress on Peripheral Equipment: Ten years ago the cost of peripheral equipment as a percentage of the total computing system averaged 30%. This year it was closer to 60%. This is due to the greater number of small-scale systems installed as well as the recognition by the computer user that the flexibility with which he can apply his system is closely related to the number and types of peripheral equipment available with the central processor.

RCA has just over forty peripheral units available with Spectra 70, including data communications equipment. However it is in the "office equipment" type of peripherals where Spectra 70 seems to have its greatest competitive weakness. RCA currently does not make any of its own paper-handling peripherals such as card reader/punches and printers. Their slowest card equipment, an Uptime reader and I.C.T. punch, rents for $1100/mo....38% more than the rental of the 70/15 processor and 30% more than IBM's 1402 reader/punch. This is the principal reason why the 70/15 and 70/25 do not offer a particularly striking price/performance ratio when compared to a small business computer such as the H-200.

We understand that RCA is striving to develop its own card equipment and a non-impact printer in order to claim a larger share of its computer systems. In the meantime they are likely to stress sales to System/360 customers where RCA processors can be used in multi-computer data communication networks with peripherals being primarily supplied by IBM.

New among the RCA peripherals is the 70/237 card reader which also can accept mark-sense cards. The 70/568 mass memory unit, an updated version of the 3488 magnetic card memory, is still one of the most attractive multi-million character storage units currently available.

Use of Integrated Circuits: The monolithic integrated circuits used in the 70/45 and 70/55 are paper-thin silicon chips, no larger than the letter "o" on a typewriter, which are chemically treated to create a gross molecular structure able to perform the logic functions which would require 15 transistors, 13 resistors and the necessary wire connections found on an equivalent conventional solid-state circuit board.

RCA foresees its advantages in using the monolithic circuits as lower manufacturing cost, lower maintenance cost, and smaller size, while lower operating costs (less power) will please the user.

About 70% to 80% of the electronics of the 70/45 and 70/55 are integrated circuits, with RCA's Components Division, Westinghouse and Fairchild being the approved vendors.

A significant manufacturing efficiency achieved by RCA in using the integrated circuits is the use of a multilayer backplane board to replace the normal wiring interconnecting circuit cards. The backplane employs a groundplane to reduce electrical noise and two printed circuit patterns for logic wiring, thus eliminating a good deal of the spaghetti-like configurations of wire found in most computers.

The production costs and speeds of integrated circuits have apparently now reached the point where nearly all new computers announced in 1965 will use integrated circuits.

Emphasis on Data Communication Systems: Since Spectra 70 has direct compatibility with System/360, RCA's largest potential market is System/360 users who are seeking a second vendor for data processing systems...but requiring that the computer system be able to work along side, rather than replace, their existing equipment. Therefore RCA has been careful to develop a standard I/O interface and data communication terminal equipment which will allow memory-to-memory communications between Spectra 70 and System/360, as well as the 301 and 3301. Spectra 70 also offers a combination of multiplexor channels which can control up to 256 I/O devices at one time.

Evidence is beginning to pile up that RCA is achieving its goals by emphasizing the ability of Spectra 70 to inter-communicate with System/360. For example, International Harvester, a company that has been an exclusive IBM computer user has placed a 70/45 on order to try it in an environment that will include some 25 System/360 models also on order.

Single-Fee Rental: Like General Electric on the Compatibles-600, RCA is offering Spectra 70 on a single-fee rental regardless of monthly usage. IBM recently dropped its extra shift rental rate from 30% to 10% of first shift rental...a move which was widely interpretated as evidence of price cutting in the computer industry. However we feel that the trend towards eliminating overtime charges is more correctly due to a shift in the typical use of a computer. In the past most computer jobs were run on a batch basis, with all work grouped to run during a single working shift if possible. However, with the advent of management information systems using data collection/data communication terminals, and scientific computing centers using time-shared inquiry stations, computers tend to be in a "ready to process" state round the clock although the actual net processing time during a day is probably still less than eight hours...therefore the de-emphasis of extra shift charges.

Deliveries begin in the fall, 1965, for the 70/15 and 70/25, and in spring, 1966, for the 70/45 and 70/55...just six months behind the deliveries of corresponding models of System/360. To make these deliveries as numerous as possible, RCA is beefing up its marketing staff 20% in the coming year. To expand their European sales base, and to replace the lost marketing assistance from Bull, RCA recently completed an agreement with Siemens & Halske A.G. for an exchange of patent licenses, technical information and sales agreements which will enable the German firm to manufacture and sell Spectra 70 in the Common Market. An agreement between RCA and English Electric is believed to be in the works for marketing Spectra 70 in England. RCA's existing English market outlet, I.C.T., is currently devoting its attention to getting its own new computer series off the ground.

What's next from RCA? The model 35 may be announced this spring if read-only memory compatibility provides an important sales factor. The 70/35 is expected to have this microprogrammed capability also and when coupled with some lower cost card and printer peripherals currently under development, it should make a very competitive small- to medium-scale computer for business applications. The giant of the line, the 70/65, is expected to use a cryogenic memory which will offer millions of bytes of storage available in usec. speeds.

If cryogenic memory development keeps on schedule at RCA's Princeton Labs, the 70/65 should be ready for announcement next fall.

In sum, Spectra 70 has lifted RCA into a vastly strengthened competitive position in the computer industry, and clearly exposed a number of market strategies that have become quite important now that the majority of new computer orders are coming from existing computer users. From the evidence to date, it appears to be selling well...important news to the EDP division who, according to RCA's Chairman Sarnoff, broke into the black for the first time this year with $100 million in revenues, and who rounded out the year with over 140 systems booked and with a 15% growth in revenues projected for 1965.

IBM TERMINATES RENTING EQUIPMENT TO OEM'S

This past month IBM informed computer builders who have been procuring IBM equipment for remarketing that in the future such equipment will be available on purchase terms only. Formerly, the same monthly rental plan for this equipment was available to the OEM's as well as IBM's regular end-user customers. The new policy does not apply to equipment already on order on a rental basis to OEM's.

In a statement given to EDP I&MR, IBM said they have "taken this step to afford itself protection against the risk of large-scale discontinuances by other equipment manufacturers who may arrange to produce or procure from other sources equipment similar to IBM equipment."

The new IBM policy seems to be at least partially a reaction to Honeywell's development of its own card handling equipment while renting nearly 200 IBM 1402 read/punch units. However probably hardest hit by the new policy is RCA which has been planning to offer the 2311 disc pack memory and an IBM bill-feed printer with Spectra 70 on a rental basis.

MOHAWK DATA SYSTEMS PLANS ANNOUNCEMENT OF DATA TERMINAL UNIT

We understand that a magnetic tape-based data terminal unit will be announced in March as the first product of Mohawk Data Systems, Herkimer, N.Y., the company formed last September by eight former employees of Univac who were principally concerned with the design and production of the popular 1004. The unit will be designed to accept data from remote data collection/data communication stations, edit it, and prepare it for computer processing in a variety of formats. It is estimated that the unit will sell for about $8000-$12,000...and be marketed primarily to end users.

MDS currently has approximately 15,000 square feet of manufacturing and office space, and a staff of 35.

THEY'RE ON SCHEDULE: The end of 1964 finds special reasons for a smile on the face of several companies in the computer industry: RCA crosses the profit line, Honeywell ships its 200th H-200 and predicts over 600 will be shipped in '65, GE gets its first 625 and 635 computers "on the air" on schedule, Burroughs counts E2100 orders, Control Data lands its sixth 6600 order at the Air Force Weapons Lab in Los Alamos, and Digital Equipment gets its PDP-6 off to Australia.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

Most of the installation figures, and some of the unfilled order figures are verified by the respective manufacturers. In cases where this is not so, estimates are based on information in the market research reference files of EDP I&MR. The figures are then reviewed by a group of computer industry authorities.

Comments on this census from informed readers will be welcomed.

AS OF SEPTEMBER 29, 1964

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	21	1
	ASI 2100	Y	$3000	12/63	5	2
	ASI 6020	Y	$2200	4/65	0	0
	ASI 6040	Y	$2800	7/65	0	0
Autonetics	RECOMP II	Y	$2495	11/58	64	X
	RECOMP III	Y	$1495	6/61	20	X
Bunker-Ramo Corp.	TRW-230	Y	$2680	8/63	11	2
	RW-300	Y	$5000	3/59	40	X
	TRW-330	Y	$5000	12/60	30	X
	TRW-340	Y	$7000	12/63	9	17
	TRW-530	Y	$6000	8/61	23	3
Burroughs	205	N	$4600	1/54	62	X
	220	N	$14,000	10/58	42	X
	E101-103	N	$875	1/56	125	X
	E2100	Y	$535	8/64	25	995
	B100	Y	$2800	8/64	7	29
	B250	Y	$4200	11/61	93	17
	B260	Y	$3750	11/62	64	172
	B270	Y	$7000	7/62	83	31
	B280	Y	$6500	7/62	92	42
	B370	Y	$8400	7/65	0	16
	B5000	Y	$16,200	3/63	35	23
	B5500	Y	$35,000	3/65	0	3
Clary	DE-60/DE-60M	Y	$525	2/60	255	0
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	36	22
	DDP-116	Y	$900	2/65	0	2
	DDP-224	Y	$3300	12/64	0	5
Control Data Corporation	G-15	N	$1000	7/55	320	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/160G	Y	$1750/$3500/$12,000	5/60;7/61;3/64	380	24
	924/924A	Y	$11,000	8/61	28	3
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	0	12
	3200	Y	$12,000	5/64	12	60
	3300	Y	$15,000	7/65	0	2
	3400	Y	$25,000	11/64	0	17
	3600	Y	$58,000	6/63	24	33
	3800	Y	$60,000	5/65	0	2
	6600	Y	$110,000	8/64	1	4
Digital Equipment Corp.	PDP-1	Y	Sold only about $120,000	11/60	54	2
	PDP-4	Y	Sold only about $60,000	8/62	44	11
	PDP-5	Y	Sold only about $25,000	9/63	58	7
	PDP-6	Y	Sold only about $300,000	10/64	1	8
	PDP-7	Y	Sold only about $45,000	11/64	0	10
	PDP-8	Y	Sold only about $18,000	4/65	0	0
El-Tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	$600	6/63	178	110
General Electric	205	Y	$2900	10/64	1	15
	210	Y	$16,000	7/59	60	X
	215	Y	$5500	11/63	27	16
	225	Y	$7000	1/61	122	3
	235	Y	$10,900	12/63	19	17
	415	Y	$5500	5/64	10	111
	425	Y	$7500	7/64	5	45
	435	Y	$12,000	10/64	0	22
	455	Y	$18,000	6/65	0	8
	465	Y	$24,000	6/65	0	4
	625	Y	$30,000	2/65	0	7
	635	Y	$65,000	12/64	0	9
General Precision	LGP-21	Y	$725	12/62	128	50
	LGP-30	semi	$1300	9/56	436	5
	RPC-4000	Y	$1875	1/61	98	1

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell Electronic Data Processing	H-200	Y	$4200	3/64	70	590
	H-300	Y	$3900	7/65	0	6
	H-400	Y	$5000	12/61	100	9
	H-800	Y	$22,000	12/60	62	7
	H-1400	Y	$14,000	1/64	9	5
	H-1800	Y	$30,000	1/64	4	7
	H-2200	Y	$11,000	10/65	0	10
	DATAmatic 1000	N	$40,000	12/57	4	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	2
IBM	305	N	$3600	12/57	507	X
	360/30	Y	$4800	5/65	0	1950
	360/40	Y	$9600	5/65	0	625
	360/50	Y	$18,000	7/65	0	325
	360/60	Y	$35,000	9/65	0	80
	360/62	Y	$50,000	11/65	0	35
	360/70	Y	$80,000	10/65	0	110
	650-card	N	$4000	11/54	385	X
	650-RAMAC	N	$9000	11/54	72	X
	1401	Y	$4500	9/60	7425	775
	1401-G	Y	$1900	5/64	240	800
	1410	Y	$12,000	11/61	435	150
	1440	Y	$3500	4/63	1050	450
	1460	Y	$9800	10/63	700	725
	1620 I, II	Y	$2500	9/60	1500	20
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	49	38
	702	N	$6900	2/55	3	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	41	X
	7040	Y	$14,000	6/63	52	32
	7044	Y	$26,000	6/63	42	15
	705	N	$30,000	11/55	84	X
	7070, 2, 4	Y	$24,000	3/60	525	38
	7080	Y	$55,000	8/61	70	3
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	48	4
	7094	Y	$70,000	9/62	254	20
	7094 II	Y	$76,000	4/64	48	50
ITT	7300 ADX	Y	$18,000	7/62	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only-$5800	3/58	158	X
	Monrobot XI	Y	$700	12/60	428	168
National Cash Register Co.	NCR-304	Y	$14,000	1/60	26	X
	NCR-310	Y	$2000	5/61	46	1
	NCR-315	Y	$8500	5/62	225	128
	NCR-390	Y	$1850	5/61	675	130
Philco	1000	Y	$7010	6/63	15	0
	2000-210, 211	Y	$40,000	10/58	19	2
	2000-212	Y	$52,000	1/63	5	2
	200-213	Y	$68,000	6/65	0	0
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	512	130
	RCA 3301	Y	$11,500	7/64	4	33
	RCA 501	Y	$14,000	6/59	96	4
	RCA 601	Y	$35,000	11/62	4	1
Raytheon	250	Y	$1200	12/60	154	8
	440	Y	$3500	3/64	5	8
Scientific Data Systems Inc.	SDS-92	Y	$900	12/64	0	9
	SDS-910	Y	$2000	8/62	78	56
	SDS-920	Y	$2700	9/62	60	8
	SDS-925	Y	$2500	12/64	0	4
	SDS-930	Y	$4000	6/64	6	24
	SDS-9300	Y	$7000	10/64	0	5
UNIVAC	I & II	N	$25,000	3/51 & 11/57	32	X
	III	Y	$20,000	8/62	75	33
	File Computers	N	$15,000	8/56	24	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	332	X
	Solid-State II	Y	$8500	9/62	43	3
	418	Y	$11,000	6/63	6	8
	490	Y	$26,000	12/61	35	17
	1004	Y	$1900	2/63	1950	690
	1050	Y	$3000	9/63	72	250
	1100 Series (except 1107)	N	$35,000	12/50	14	X
	1107	Y	$45,000	10/62	20	7
	1108	Y	$50,000	7/65	0	8
	LARC	Y	$135,000	5/60	2	X
				TOTALS	22,202	10,625

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

September 14 - September 25, 1964

	1964 High	1964 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	1178	45 3/8	42	42 1/4	-2 7/8	-6.59
American R & D	27	18 1/8	102	19 1/2	18 1/2	19	-1/2	-2.53
Burroughs	29	22 1/8	1077	29	27 5/8	27 7/8	-5/8	-2.60
Control Data	111 7/8	74 1/4	1243	88	81 1/8	87	+3 7/8	+4.42
Electronic Associates	27 3/8	20 1/8	662	23 3/4	20 1/4	23 1/8	+2 1/8	+9.94
General Dynamics	38 1/8	23 1/2	3231	38 1/8	34 1/2	37 5/8	+1 5/8	+5.14
General Electric	90 5/8	78 3/4	1550	89	85 7/8	88 7/8	+5/8	+0.76
General Precision	32 3/4	25 1/2	879	32 3/4	30	32 1/4	+2 1/8	+7.69
Honeywell	148 3/4	115 1/4	526	125 3/8	117	125 3/8	+3 5/8	+2.83
IBM	494	412	1070	441 1/2	412	438 3/4	+13 1/2	+3.01
Inter. Tel. & Tel.	60	52 5/8	666	56 5/8	55	56 1/8	-1/4	-0.46
Litton Industries	79 5/8	58 1/4	1231	73 3/8	68 3/4	72 1/8	+2	+3.13
Nat. Cash Register	82 1/2	63	1224	81 1/2	77 3/8	78 1/2	-3	-4.00
Packard Bell	15 1/2	7	346	11 3/4	9 5/8	11 1/2	+1 1/4	+16.13
RCA	39 1/4	30	3342	33 3/8	31	31 1/2	-1 5/8	-5.12
Sperry Rand	21 3/4	12 3/4	4048	15 1/4	13 3/4	14 7/8	+1 1/8	+7.96
Xerox	125 3/4	70	4875	125 3/4	106 5/8	125 5/8	+19 1/8	+17.71
NYSE COMPUTER STOCK AVERAGE							+2.48	+3.38
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	197	27 7/8	24 1/8	26 3/8	-7/8	-3.18
Bunker-Ramo	13 5/8	7 3/8	346	8 7/8	7 3/4	7 7/8	-3/4	-8.82
Clary	7 1/2	5 1/4	67	5 5/8	5 1/4	5 3/8	+1/8	+2.08
Computer Sciences	29 5/8	15 3/8	386	24 1/8	19 3/4	23	+3 1/2	+19.58
Potter Instrument	12 1/4	6	123	8 3/4	6 1/8	8 1/2	+2	+32.00
AMEX COMPUTER STOCK AVERAGE							+0.80	+8.33

	1964 High Bid	1964 Low Bid	Sept. 25 Bid	Sept. 25 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	15	9 1/4	9 3/4	10 1/2	10 5/8
Computer Control	19 5/8	12 3/4	13 3/4	14 3/4	15 1/4
Data Products	8 1/8	2 3/4	2 3/4	3 1/4	2 7/8
Digitronics	20	6 3/4	8 3/8	9 1/4	8
Dura Corp.	28 1/2	23 7/8	26 1/2	28 1/4	28 1/4

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INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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IBM UPGRADES PERFORMANCE OF SYSTEM/360 TO MEET STIFFENED COMPETITION; OFFERS SELECTIVE PRICE REDUCTIONS

A recent computer advertisement from IBM carries the headline, "Why System/360 can't be copied", followed by some crisp copy emphasizing the extra value in IBM's programming and systems support services. Better evidence of the growing competitive sales battle in the computer field couldn't be offered... it's the first time in our memory that IBM, the industry giant, has felt the need to run a promotion campaign directly aimed at retorting competitive claims (in this case the program compatibility of RCA's Spectra 70 with System/360).

IBM's reaction to the competitive situation in the computer field goes much deeper than an aggressive promotion campaign, however. In fact, it is active on three major levels: realignment of division responsibilities, equipment changes, and price revisions.

Corporate Changes: IBM recently created a special Field Engineering Division with the responsibility for installing and maintaining computers at customer locations. The new division is made up of IBM customer engineers who were formerly members of the Data Processing Division. This transfer, although not altering the type of work done by IBM's nearly 9000 customer engineers, will remove the burden of administration of this huge service group from the shoulders of management at the DP Division, leaving them freer to concentrate on direct sales activities...

...which themselves have recently been expanded to include the marketing of two data processing machines previously handled by IBM's Office Products Division. These are the 632 Electronic Typing Calculator and the 6400 Magnetic Ledger Card Accounting Machine. The announcement of the System 360/20 which offers expanded data processing capability in the cost range of these two units created the possibility of inter-divisional sales competition for an equipment order from the same customer to serve the same application. The shift eliminates the possibility of such inter-divisional clashes. It also increases the repertoire of equipment which the DP Division salesman has to offer the small-scale data processing machine user...although the 632 is virtually obsolete and the 6400 is rumored to have fallen far short of IBM's sales forecasts, being substantially outclassed by equipment such as the Burroughs E2100 and the NCR 395.

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A key corporate move just announced is the unification of the computer development and the manufacturing activities at IBM into two new divisions, replacing the former Data Systems, General Products, and Components divisions. The new divisions are the Systems Development Division with responsibility for all IBM data processing laboratories and the Systems Manufacturing Division with responsibility for all IBM plants manufacturing data processing systems and components. This move appears to be a corporate reflection of the fact that since System/360 is a compatible system spanning IBM's entire present data processing line, there was no further need to maintain a Data Systems Division for the 7000 series computers and a General Product Division for 1400 series computers.

Equipment Changes: To get closer to recently-announced competitive equipment on a price/performance basis, we understand that IBM will make several equipment changes within System/360 including (1) upgrading the capability of existing equipment, and (2) the introduction of new models.

IBM anticipated the need to make performance improvements in System/360 by over-designing the electronic circuitry in the computer models so that they could handle faster memory access speeds and processing times than those initially announced...equivalent to performance improvements of between 25% to 50%...giving them flexibility in setting their price/performance ratio. IBM cashed in on some of this competitive insurance when they recently decreased the memory access time of the model 30 from 2 usec. to 1.5 usec...improving computation speed by nearly 25%. When coupled to the 33 1/3% improvement in the performance of the magnetic tape units on the model 30, these changes yield an overall performance improvement of up to 30%.

We understand that IBM will take the new model approach in offering improved computer performance in the model 40 class...calling for the announcement of the model 42 in the near future with a memory cycle time in the neighborhood of 1.8 usec., resulting in significantly improved EDP performance with costs which will be only slightly higher than the model 40...nearly eliminating the 40 as a competitive factor in System/360.

In the large-scale area, we understand that IBM is planning to strengthen its position in the market for computers in the class of the models 50, 62, and 70 by systematically upgrading the memory speeds of these models in the near future. Also, it is likely that IBM will announce a new model with processing power between the 62 and 70 and with special features to enhance its attractiveness to the prospective user of a time-shared system...a market area where IBM has suffered some stunning and well-publicized set-backs in recent months, particularly to the GE 600 series. The new model will most likely offer a memory-centered processing capability which will allow more effective multi-processing as well as improved multi-segmented memory protection, allocation and control so that the machine can handle multiple users at remote consoles efficiently.

The introduction of System/360 equipment with improved capability for time-sharing applications is a logical addition to a series of concerted moves by IBM to strengthen its technical and psychological position in this growing market following the loss of key time-shared computer system contracts at MIT, the Bell Labs, and Northrop Corp. Such a move was the recent centralization of development and marketing activities for time-sharing systems with the creation of a new post: Director of Time-Sharing Systems. In addition IBM widely

publicized last month the opening of its time-sharing service center in New York using a 7040 computer with the facility for allowing remotely located users to communicate with and solve problems on the machine at a cost of only about $10. per hour plus communication costs. The system is, however, limited to forty users. A similar installation at IBM's Los Angeles Datacenter has just been announced.

Another equipment improvement expected in System/360 is the doubling of the disk pack storage capacity on the popular 2311 random access unit from 7.25 million 8-bit bytes to 14.5 million. This is achieved by doubling the recording density, something the 2311 is capable of handling without significant engineering changes. This gives a single disk pack a storage capacity about equal to a 2400' reel of magnetic tape...aiding reel-by-reel conversion to the 2311 by users of large tape files.

Pricing Revisions: IBM has just notified customers of two price reductions of significance. One is that the core storage units for the 7080, 7090, 7094 and 7094II and the instruction processing unit of the 7094 and 7094II have been reduced by 15% from the previous list or option-to-purchase-plan prices. One likely motivation for this discount is that IBM is not faring well in converting users of its 7080 and 7090 series equipment into System/360 customers so they wish to encourage these users to purchase the main elements of the central processor of their system to lessen the chance that these computers will be replaced by competitive equipment in the near future. As of January 1, there were about 30 leased 7080 and 130 leased 7090, 7094 series computers at customer installations in the U.S. This represents a potential purchase value of, roughly, $100 million if all customers took advantage of the reduced purchase price...an unlikely event.

The second price revision initiated by IBM calls for a 90% discount on the pro rata monthly rental cost of a currently installed computer when the customer installs and begins paying rental on System/360 equipment acquired to replace it. This reduction applies for a two month period on the 305, 650 and 1400 series systems, and for four months on the 1410 and 7000 series systems. IBM's purpose apparently is to even out equipment charges to the user during the conversion period to System/360. For example, the user of a 1401 tape system renting for $7000 per month would pay only $4. per hour for the machine rather than $40. per hour under the regular first-shift rental plan.

An announcement widely misinterpreted was IBM's official confirmation last month that System/360 deliveries would start this spring for the smaller models, three months earlier than previously indicated. However IBM's sales representatives have been quoting the earlier delivery dates from the date of System/360 introduction...recognizing that IBM is very conservative in the announcement of anticipated first delivery dates.

Orders for System/360 continue to mount, but at a considerably slower pace now that available delivery dates have been booked well into 1966. In IBM's Eastern Region (representing about 40% of U.S. sales), for example, model 30 orders have risen some 42% from 612 to 885 from June 30 to December 30. In the same period, model 40 orders increased 23% from 144 to 176, and model 50 orders rose 35% from 59 to 81. Our world-wide census estimates for System/360 orders as of January 28th are listed at the top of the next page.

IBM SYSTEM/360 ORDERS AS OF JANUARY 28TH

Model	No. of Orders
360/20	1200
360/30	2200
360/40	550
360/50	280
360/60	45
360/62	20
360/70	60
360/92	2

From the financial viewpoint, IBM should experience increased sales in 1965 (as they consistently have), but at a reduced rate from the 13.2% sales increase registered last year. We look for total sales for IBM in 1965 of about $3.08 billion, an increase of 8% over 1964. Net earnings before taxes should show an even sharper percentage drop in 1965, when the major burden of programming, marketing, and installation service costs of the System/350 must be borne with only eight or fewer months of rental income realized to offset these charges. Also, customers inclined to make outright purchases of capital equipment such as computers will probably wait six months to a year before putting their money on the line, waiting to assure themselves that System/360 is able to fulfill their expectations. This will delay until 1966 a considerable share of the income from the purchase of System/360 units installed this year.

The bright spot in the earnings picture for IBM this year is the growing European market still eagerly installing 1440's and 1460's. However even with this help, we doubt if IBM's net earnings before taxes this year will rise above $940 million, a gain of about 5% over last year, compared to the 15.5% increase between 1963 and 1964.

NCR EXPANDS MEMORY AND PERIPHERALS OF 390 COMPUTER TO CREATE A NEW OFFERING: THE SERIES 500; ALSO PLANS EXTENSIVE SERVICE CENTER OPERATIONS

Last week NCR demonstrated that a new computer offering can be developed to serve an expanded market area without a steep investment in new engineering and programming. In announcing the NCR Series 500, the company introduced a computer system incorporating a central processor virtually identical with that used in its current 390 magnetic ledger card computer, but with a core memory expanded to 2400 or 4800 characters, and a broadened line of low-cost peripheral equipment.

Billing the machine as a computer designed to fill the gap between its 395 electronic accounting system and its medium-scale 315 computer system, NCR said the Series 500 will offer its lowest cost configuration for $765 a month and its most comprehensive system at about $2500 a month. O. B. Gardiner, NCR data processing vice president, pointed out at the announcement that there are nearly half a million U.S. companies with assets above $100,000, many of which could utilize the low-cost EDP capability offered by the Series 500.

More than 20 different peripheral equipment units are offered for the Series 500, including a buffered line printer with a speed of 125 lines-a-minute,

and three paper tape readers with speeds from 30 to 600 characters-a-second. Card equipment on the Series 500 includes a 100 card-a-minute reader and punch. Optical type font, magnetic ledgers and console input can also be handled by the new system.

Selling computers in this low-cost area is growing increasingly competitive now that the System 360/20, the E2100, and the Series 500 are available...at one time the Univac 1004 was the only data processor effectively serving this market. A new competitor will be added to the field next week when Honeywell announces its model 120, a low-cost system compatible with the H-200 and renting as a card system for under $2000 per month. Also, the long-awaited model 10 of the System/360 line is expected to be introduced this spring.

NCR does have a good customer base to which to offer the Series 500...including some 800 users of the 390. They also have an encouraging industry precedent in the successful marketing of the Burroughs B100 Series...a system introduced a year ago composed of the same central processor as the older B200 Series but surrounded by new low-cost peripheral units. The B100 has done surprisingly well in the market. NCR itself has a strong start with over 100 orders for the new system already logged in. First deliveries are scheduled for the summer.

NCR's overall position in the EDP market has been growing steadily. Last year the total number of NCR computer systems installed rose to over 1,000 and revenue from rented business systems, particularly computer systems, increased by more than 55% over the comparable 1963 period. About 225 of these are outside the U.S. giving NCR fourth position among U.S. firms in the European market...outranked only by IBM, Univac, and RCA.

New products introduced in 1964 included the 315 RMC (Rod Memory Computer) system (see Vol 1. #7), the 395 electronic accounting system, and important new peripheral equipment. NCR now has some one hundred different peripheral equipment models on its EDP roster to meet a wide range of business requirements.

The company continued development in a number of R&D areas holding promise for business systems of the future, including PCMI (Photochromic Micro-Images), integrated circuits, microencapsulation, fluid logic, and thermal printing.

This year NCR expects to expand its network of data processing centers at home and abroad. Currently it has 12 centers in the U.S. and 14 overseas. Several of the new centers will feature "on-line" data processing services for savings banks, and savings and loan associations. This service will offer instantaneous processing of both savings and mortgage accounts by directly connecting teller's machines at subscribing banks via telephone lines with an NCR 315 CRAM computer located in a nearby data center.

The company's first "on-line" computer center is scheduled to open in New York City in the spring with eight savings banks and one savings and loan association, representing a total of over a million accounts, signed up for the service. A similar Pittsburgh center, which is scheduled to open in mid-year, has service contracts with 18 savings and loan associations.

NCR's schedule for the next 18 months calls for similar "on-line" processing centers to be established in Chicago, Los Angeles, San Francisco and Boston. The company said it would also offer a comparable service wherever sufficient

demand develops. Each center is capable of providing effective service to subscribers as far away as 300 miles. The New York City center, for instance, will cover New Jersey, Connecticut, and Long Island, and the Boston center will serve the remainder of New England.

The 315 systems used for the service will have as many as eight CRAM units for a capacity of up to one and one-half million accounts. Each center will have another 315 system available for back-up. The systems all use NCR "Class 42" teller's machines specially wired for data transmission.

NCR currently has "on-line" installations at individual financial institutions in New York City, Brooklyn, Rochester, Buffalo, Pittsburgh, and Ft. Lauderdale. Another system in the New York City area is in the final stages of installation and a dozen more are scheduled to be installed within the next year.

A-M PLANS TO WITHDRAW ITS EDP SYSTEMS FROM MARKET

Addressograph-Multigraph Corp. is planning to withdraw its 943 medium-scale data processing system and 960 off-line processor from the market, we understand.

The 943 and 960 units were primarily offered to traditional A-M customers such as publishers and mailing list service firms who were interested in automating their list operations. Neither machine has had an encouraging acceptance (about eleven sold), primarily because A-M never made the substantial investments in marketing and systems support necessary to sell successfully a complete EDP system.

Also effected by this termination is ANelex who had worked closely with A-M in the development of the 960 Printer-Processor and whose 1000 line-a-minute printer is the key element in the system.

While no longer marketing complete EDP systems itself, A-M is believed planning to continue to develop and market a variety of data gathering and data reproduction equipment which will work on a direct basis with a computer system. In fact, A-M's 1964 Annual Report predicts that "the market potential for devices to speed up these peripheral areas is equal to or greater than that existing for the central computers themselves". The company feels that several of its divisions offer the skills and product capability to successfully compete in this market...such as the plastic card technology of Emeloid, the carbon papers, ribbons and inks of Buckeye for OCR equipment, and the mechanical precision of A-M data recorders for conversion to the signals required for computer input.

In dropping out of the main frame computer business, A-M has joined the scorched fraternity of companies such as Bendix, Eltronics, General Mills, North American Aviation, Royal McBee, and Underwood who have either merged their computer activities with those of another manufacturer, or have closed their computer shop permanently.

RCA HAS REGISTERD A KEY ORDER FOR ITS SPECTRA 70 SERIES AT THE CHASE MANHATTAN Bank. The Chase is ordering three 70/15's and two 70/25's to keep track of the hundred of millions of shares of stock involved in the agency trust functions performed by the bank. The new order will bring to 25 the number of RCA computers employed by the Chase...where,incidentially, RCA banks.

BURROUGHS ACHIEVES 20% INCREASE IN NET EARNINGS

Burroughs proved to be the bright turn-around situation in computer industry last year as it achieved 20% increase in earnings, from $8.5 million in 1963 to $10.2 million last year. Sales totaled $392 million in 1964, up from $390 million in 1963. President Ray Eppert has looked bullishly into 1965 and predicted a 40% increase in earnings this year.

The basis for Eppert's optimism is apparently founded on two factors: (1) the success Burroughs has had in extending the installed life of its leased data processing systems, and (2) the strong market acceptance of its new E2100 Direct Accounting Computer.

Burroughs has extended the installed life of its leased computer installation by offering its customers improved equipment on a subsystem-by-subsystem basis. For example, when the processing speed of the B200 Series fell behind competitive equipment, Burroughs introduced an improved processor (the B203's) and offered it on a replacement basis to its existing customers...absorbing part of the direct replacement costs in order to extend the leased life of the peripheral equipment at the installation. And as indicated in the NCR story in this issue, they have also been successful in offering these replaced processors at reduced costs in a B100 Series.

They achieved a similar feat with the new B5500 which offers existing B5000 users a faster memory and an automatic operating system (achieving a three-fold performance improvement) for only a slight increase in monthly rental for an identical system configuration. Here again Burroughs is absorbing part of its replacement costs to extend the life of the installation.

The E2100 unit is claimed to have over 2000 orders in its first ten months on the market, with a selling price from $18,000 to $30,000 (about 95% of the units are being purchased outright). The system is intended to offer a more economical, easier-to-use alternative to a small punched card installation... and customers are clearly finding the proposition convincing.

Helped considerably by the E2100, incoming commercial orders established a new record last year, showing an increase of 22% over 1963. To accelerate this increase, Burroughs is undergoing a vigorous expansion in its marketing arm including the establishment of 24 new branch sales and service offices in the U.S. alone.

New equipment announcements in 1965 are also promised by Eppert, and we have learned that these will include a 1040 line-a-minute printer and a 1400 card-a-minute reader as part of the peripheral package for a new medium-scale processor. These units may be introduced shortly, possibly in conjunction with the announcement of further models of the B300 series (a B370 was announced last June).

ONE BILLION DOLLARS A YEAR WILL BE THE SIZE OF THE MARKET FOR INDEPENDENT software services by 1970 predicts Vernon Walker, president of Mesa Scientific Corporation. By his calculations, independent computer software firms had sales of $300 million last year, will have sales of $400 million this year, and should reach $500 million by the end of 1966.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

January 11 - January 22, 1965

	1964-65 High	1964-65 Low	2 weeks Sales In 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	737	50 1/4	47 5/8	49 1/4	+1 5/8	+3.41
American R & D	27 3/8	18 1/8	186	25 1/2	22 3/4	23 5/8	+1 3/8	+6.18
Burroughs	30 7/8	22 1/8	5283	30 7/8	26 3/8	30 3/8	+4	+15.17
Control Data	61 1/4	45 1/4	1159	59 1/2	55 1/2	57 1/2	-1	-1.71
Electronic Associates	27 3/8	17 5/8	791	20 5/8	18 3/8	18 3/4	-1/8	-0.66
General Dynamics	41 1/8	23 1/2	1749	38 5/8	36 1/4	37	-1	-3.25
General Electric	98 1/4	78 3/4	2102	98 1/4	94 3/8	97 3/4	+3 1/2	+3.71
General Precision	33 7/8	25 1/2	341	30 5/8	28 3/8	29 1/8	-1	-3.32
Honeywell (new)*	64 7/8	59 3/4	495	64 7/8	62 1/8	63 3/8	+3/8	----
IBM	494	404	1002	446 3/4	421	446 3/4	+21 3/4	+5.12
Inter. Tel. and Tel.	63 7/8	52 5/8	1134	63 7/8	61	62 1/2	+1 1/2	+2.46
Litton Industries	81	58 1/4	1360	81	77 1/2	79 3/4	-3/4	-0.93
Nat. Cash Register	84 3/8	63	474	76 1/2	74 3/4	75 1/8	-3/8	-0.50
Packard Bell	15 1/2	7	238	12 1/2	10 1/2	10 1/2	-1 3/8	-11.58
RCA	39 1/4	30	6701	33 3/8	32	32 1/2	-1/2	-1.52
Sperry Rand	21 3/4	12 3/4	3724	14 7/8	13 3/4	14 1/8	+3/8	+2.73
Xerox	131 7/8	70	2909	108	99 1/2	106 7/8	+7 3/4	+7.82
NYSE COMPUTER STOCK AVERAGE							+2.13	+1.59
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	386	30	26 7/8	28 5/8	+1 5/8	+6.02
Bunker-Ramo	13 5/8	6 5/8	431	9 1/2	8 5/8	9	-1/4	-2.86
Clary	7 1/2	4 3/4	63	5 /38	4 3/4	4 7/8	-1/4	-4.88
Computer Sciences	29 5/8	15 3/8	132	23 3/8	21 3/8	22 1/8	+1/8	+0.57
Potter Instrument	12 1/4	6	31	7 3/8	6 7/8	6 7/8	-1/2	-6.78
AMEX COMPUTER STOCK AVERAGE							+0.15	+1.45

	1965 High Bid	1965 Low Bid	Jan. 22 Bid	Jan. 22 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	8 1/8	7	7	7 5/8	7 1/4
Computer Control	11 5/8	10 3/4	11 5/8	12 5/8	10 7/8
Digitronics	6 5/8	6	6 1/8	6 7/8	6 5/8
Dura Corp.	32 7/8	28 1/8	32 1/2	34 1/2	29

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HONEYWELL ANNOUNCES THREE ADDITIONS TO ITS SERIES 200 COMPUTER LINE; NEW CARD EQUIPMENT GIVES IT CLAIM TO FULL LINE OF SELF-BUILT STANDARD PERIPHERALS

Honeywell's EDP division displayed impressive evidence last week to prove that its popular H-200 computer was just the first-born of a full generation of modularly expansible computers, peripheral equipment and memory devices. The event was the unveiling of three new members of Honeywell's Series 200: the 120, 1200 and 4200 processors (the 200 and 2200 were previously announced). The five computers form a program compatible family with processors available in 55 different memory speed/size combinations. Also announced were several new low cost peripherals including a printer (450 lines-per-minute at $650 per month), a magnetic tape drive (13.3 kc at $225 per month) and a card reader/punch (400 cards a minute at $350 per month)...the last unit being Honeywell's first self-built card reader-punch (previously ones being supplied mostly from IBM).

The table on the next page gives a profile of the characteristics of Series 200 as well as those of IBM's 1400 series, the computers for which Honeywell offers a program translating package called "Liberator". For comparison purposes, a profile of two major competitive lines, IBM's System/360 and RCA's Spectra 70, is included.

As the data in the table indicates, the 120 offers a remarkably low-cost tape system...an 8K processor with the new card reader/punch, new printer, and three tapes rents for $2985 per month. The 1200 fits almost exactly between the 200 and 2200 in price and performance, while the 4200 is the giant of the line offering up to half a million characters of storage and access times in the nanosecond range.

The 4200 will use silicon integrated circuits in its construction, with either plated-wire or thin film used in the fabrication of its main memory. Hybrid circuits will be used in the smaller processors, with a conversion to integrated circuit construction in the full line expected "in three to four years" by Honeywell. The 120 and 1200 are scheduled for delivery in February, 1966, while the first delivery of the 4200 is set for the end of 1966. The first installation of the 2200 is still planned for the late fall of this year.

The Series 200 offers extensive features for handling data via communication lines. An automatic interrupt for data communications is a standard

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A CHARACTERISTICS PROFILE OF TWO PROGRAM-CONVERTIBLE COMPUTER LINES

This table provides a characteristics summary of two generations of IBM computers and of the competitive equipment which was designed with a parallel programming structure so that IBM customers would not have to reprogram extensively in using the competitive equipment. These are the 6-bit word machines, IBM's 1400 Series and Honeywell's Series 200, and the 8-bit word (byte) machines, IBM's System/360 and RCA's Spectra 70.

Characteristics / Model	Word Size in Bits	Main Memory Size (Words)	Main Memory Cycle Time (msec)	Decimal Add Time A+B→C 5 Digits (msec)	Monthly Rental Typical Card System	Monthly Rental Typical Tape System
H120	6	2K-32K	3	105.0	$1900	$3500
H200	6	4K-65K	2	44.0	$2300	$6000
H1200	6	8K-131K	1.5	33.0	$3700	$8000
H2200	6	16K-262K	1	22.0	$5200	$10,000
H4200	6	32K-524K	.75/4 wds.	7.5	N.A.	$16,800
IBM 1401	6	1.4K-16K	11.5	230.0	$4100	$5900
IBM 1401-G	6	1.4K-4K	11.5	230.0	$2200	N.A.
IBM 1440	6	2K-16K	11.1	222.0	$3100	$4200
IBM 1460	6	8K-16K	6.0	120.00	$5500	$11,000
IBM 1410	6	10K-80K	4.5	88	$6,100	$12,200
IBM 7010	6	40K-100K	2.4/2wd	33.0	$13,900	$20,000
IBM 360/20	8	4K-16K	3.6	135.0	$1750	N.A.
IBM 360/30	8	8K-65K	1.5	56.3	$3900	$6500
IBM 360/40	8	16K-262K	2.5/2wd	40.6	$5220	$10,780
IBM 360/50	8	65K-262K	2.0/4wd	20.0	$12,000	$16,100
IBM 360/60	8	131K-524K	2.0/8wd	8.0	N.A.	$30,300
IBM 360/62	8	262K-524K	1.0/8wd	6.0	N.A.	$45,000
IBM 360/70	8	262K-524K	1.0/8wd	5.4	N.A.	$58,000
RCA 70/15	8	4K-8K	2	48.0	$2600	$4100
RCA 70/25	8	16K-65K	1.5	28.0	$3800	$5800
RCA 70/45	8	16K-262K	1.44	18.0	$5600	$9500
RCA 70/55	8	65K-524K	0.84	6.6	N.A.	$14,300

feature on all processors. Twenty-five single-, multiple- and special-purpose communications devices are offered with the system. Eight-bit code handling capability is available on all processors, allowing Series 200 to operate with data received from System/360 and Spectra 70 units. A unique Data Station which can handle paper tape and punched cards, optically read documents, print data, and transmit and receive information over telephone lines is also available with the system.

We find three significant aspects of the Honeywell announcement in (1) self-built peripherals, (2) the replacement market, and (3) application packages.

Self-Built Peripherals: With the introduction of its own card punching equipment, and its upcoming announcement of a low-cost mass memory system, Honeywell stands to become the only computer manufacturer outside of IBM which makes a full line of standard peripheral devices. This is of prime importance to a manufacturer of small- or medium-scale computers where peripheral equipment can account for from 50% to 80% of the rental value of the system...if the manufacturer is buying his peripherals from an outside source, a considerable share of the income from a system has to be passed on to the peripheral maker.

Honeywell's new mass memory system, scheduled for announcement in late March, is believed to consist of replaceable cartridges of magnetic cards which offer on-line storage capacities from 7 to 56 million characters, depending on the number of cartridges handled by the system at one time. Average access time is expected to be about 120 msec.

Replacement Market: As we have described in previous issues, the H200 has a command structure virtually identical with that of IBM's 1400 series, and as such, Honeywell can offer a program translator to convert 1401 programs to program usable on the H200. The larger members of the Series 200 allow Honeywell to extend its conversion capability to all computers in the 1400 series including the 7010. Honeywell recently claimed that 50-60% of their orders for the H200 have come from 1400 series users who were attracted by the faster operating speeds and the facile program conversion techniques of the H200...so the successful use of this program conversion technique can be of critical importance in gauging the market acceptance of the Series 200.

To find out how users have fared with the "Liberator" conversion package our editorial staff interviewed 25 H-200 users who previously had a 1400 series machine. The users were selected at random from our market data file of computer installations which contains information on over 85% of the computer installations in the United States. The results of this survey were:

Q1: What percentage of your programs did you "liberate" to the H200 language rather than re-write?

An average of 80% of the programs were "liberated" while the rest were re-written, largely to improve their inherent efficiency and to take full advantage of the simultaneity of the H200.

Q2: What method was used for liberation: EASYTRAN for symbolic language translation or BRIDGE for machine language translation?

EASYTRAN was used almost exclusively because of the better documentation that resulted.

Q3. How much hand-coded patchwork was required to achieve complete conversion on the average program?

Answers ranged from a few minutes to several hours, depending on the size and complexity of the program.

Q4. What was the running time of the liberated program on the H200 compared with the 1400 series machine?

Users found translated programs ran "just a little faster" to "twice as fast" on the H200. An exception were sorts which in some cases ran five to six times faster on the H200.

Q5. What areas of improvement are needed?

Generally people were well pleased with the success of the Liberator approach, saying that it was more successful than they had anticipated. Several people mentioned that better documentation was needed so that the user could translate programs without elbow-level guidance from the manufacturer's representative...many of whom were described as being still too inexperienced in the industry to be of substantial help.

In sum, the Liberator approach, which was discounted by many when first announced, seems to have been quite successful both as a marketing concept as well as a working tool for the user. Since there are about 11,700 1400 series computers installed in the world today, with most of them being used as stand-alone systems, Honeywell has an enviable population of current computer users from which to round up a growing share of the market.

Application Packages: Naturally, Honeywell can not only translate end-user programs but it can also translate the numerous application packages available on 1400 series equipment...using the end product as a well-developed base from which to prepare their own application packages to take full advantage of the features of the Series 200. Honeywell has already put together 35 application packages for major EDP tasks in manufacturing, education, hospitals, banking, utilities, life and health insurance, fire and casualty insurance, retailing, etc. Presumably a good number of these could have their core prepared by the translation approach with a considerable saving in software cost. Honeywell has then elaborated these to fit a range of computer sizes.

The inclusion of a scientific option with the 1200, 2200, and 4200, allowing floating point operations, implies almost a complete about-face for Honeywell in its approach to serving the business and the scientific/engineering markets. The approach suggested by the earlier announcement of the H300 as the scientific partner of the H200 was two separate yet parallel series of computers, one serving the business user and the other the scientific user. The switch puts Honeywell in line with the "one system for all uses" philosophy being promoted by IBM. It indicates that the H300 will be completely withdrawn from the market, destined to be a ghost machine that is never built.

Honeywell reports that during the fall of last year their EDP division ran on a profit-making basis, and they expect that 1965 will prove to be the first year in the black for the EDP division.

Domestically, Honeywell expects to increase its EDP marketing force by 30% this year, from the current level of 1600 people working from more than 50 sales offices. Overseas Honeywell is conducting an aggressive effort to expand its market coverage. It increased its overseas marketing force by 100% last year, and expects a similar increase this year. Its recent agreement with Saab gives Honeywell its first marketing base in the Scandinavian countries. It currently enjoys a special cost advantage in Britain due to the recent 15% surcharge on imports of computers...its Scottish manufacturing plant supplies computers for use in the British Isles.

Probably the key ratio in Honeywell's long-range financial success in EDP will be the percentage of its customers who purchase rather than lease its systems. Currently only about 15% of the H200's are being purchased by users. Since Honeywell writes off its computers over a six-year period (average installed life of a leased system is five years), they will have to sell a higher percentage of their Series 200 systems, or achieve an unusually long installation life for them, to avoid losses when their leased equipment is replaced toward the end of this decade.

GENERAL PRECISION WITHDRAWS FROM COMMERCIAL COMPUTER FIELD

General Precision Equipment Corp. is terminating the marketing of its commercial computers, the LGP-21, LGP-30 and the RPC-4000. These were being sold by its Commercial Computer Division in Glendale, Calif.

The LGP-30 and RPC-4000 are vacuum tube machines, first introduced in 1956 and 1960 respectively. The LGP-30, introduced in 1962, is a transistorized computer renting for about $725 per month. G-P's computers achieved a total of about 660 installations but slow sales in recent months and returned systems have caused a build-up of computers in inventory.

In making the change, G-P said it is charging $5.5 million against earned surplus to provide for unrealized assets and expenses relating to the dismantling of their commercial computer effort. The company said that it would continue to manufacture military computers and computer components such as rotating disc memories, and encoders.

The company originally entered the commercial computer business in the late '50's when it joined with Royal-McBee Corp. to form the Royal Precision Corp. to handle computer marketing activities. In 1962 Royal sold G-P its 50% interest in the RPC. After the split, G-P concentrated its efforts in marketing its newly announced LGP-21 in specific application areas, such as civil engineering, with only moderate success. Word began passing in the computer industry last fall that the G-P's Commercial Computer group was on the block but apparently no qualified takers appeared.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF JANUARY 30, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	22	0
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	0	3
	ASI 6040	Y	$2800	7/65	0	3
Autonetics	RECOMP II	Y	$2495	11/58	60	X
	RECOMP III	Y	$1495	6/61	15	X
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	7	2
	BR-300	Y	$5000	3/59	40	X
	BR-330	Y	$5000	12/60	30	X
	BR-340	Y	$7000	12/63	13	7
	BR-530	Y	$6000	8/61	12	X
Burroughs	205	N	$4600	1/54	61	X
	220	N	$14,000	10/58	40	X
	E101-103	N	$875	1/56	100	X
	B100	Y	$2800	8/64	22	28
	B250	Y	$4200	11/61	96	5
	B260	Y	$3750	11/62	120	120
	B270	Y	$7000	7/62	120	25
	B280	Y	$6500	7/62	60	30
	B370	Y	$8400	7/65	0	22
	B5000/B5500	Y	$20,000	3/63	35	3
Clary	DE-60/DE-60M	Y	$525	2/60	281	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	50	13
	DDP-116	Y	$900	2/65	0	24
	DDP-224	Y	$3300	2/65	0	14
Control Data Corporation	G-15	N	$1000	7/55	325	X
	G-20	Y	$15,000	4/61	28	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	416	8
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	2	14
	3200	Y	$12,000	5/64	33	35
	3300	Y	$15,000	7/65	0	25
	3400	Y	$25,000	11/64	3	15
	3600	Y	$58,000	6/63	33	18
	3800	Y	$60,000	5/65	0	16
	6400	Y	$40,000	12/65	0	1
	6600	Y	$110,000	8/64	2	6
	6800	Y	$140,000	4/67	0	0
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	57	2
	PDP-4	Y	$1700	8/62	54	6
	PDP-5	Y	$900	9/63	95	10
	PDP-6	Y	$10,000	10/64	3	8
	PDP-7	Y	$1300	11/64	5	14
	PDP-8	Y	$525	4/65	0	40
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	$600	6/63	180	165
General Electric	205	Y	$2900	10/64	10	18
	210	Y	$16,000	7/59	57	X
	215	Y	$5500	11/63	35	8
	225	Y	$7000	1/61	135	5
	235	Y	$10,900	12/63	30	14
	415	Y	$5500	5/64	30	75
	425	Y	$7500	7/64	13	40
	435	Y	$12,000	10/64	3	20
	455	Y	$18,000	6/65	0	2
	465	Y	$24,000	6/65	0	1
	625	Y	$50,000	12/64	1	11
	635	Y	$65,000	12/64	1	16
General Precision	LGP-21	Y	$725	12/62	143	X
	LGP-30	semi	$1300	9/56	430	X
	RPC-4000	Y	$1875	1/61	98	X
Honeywell Electronic Data Processing	H-200	Y	$6000	3/64	250	550
	H-300	Y	$3900	7/65	0	10
	H-400	Y	$8500	12/61	108	5
	H-800	Y	$22,000	12/60	70	15

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd.)	H-1400	Y	$14,000	1/64	9	2
	H-1800	Y	$30,000	1/64	5	8
	H-2200	Y	$12,000	10/65	0	26
	DATAmatic 1000	N	$40,000	12/57	4	X
H-W Electronics, Inc.	HW-15K	Y	$490	6/63	3	X
IBM	305	N	$3600	12/57	200	X
	360/20	Y	$1800	12/65	0	1200
	360/30	Y	$4800	5/65	0	2200
	360/40	Y	$9600	5/65	0	550
	360/50	Y	$18,000	7/65	0	280
	360/60	Y	$35,000	8/65	0	45
	360/62	Y	$50,000	9/65	0	20
	360/70	Y	$80,000	10/65	0	60
	650-card	N	$4000	11/54	280	X
	650-RAMAC	N	$9000	11/54	55	X
	1401	Y	$4500	9/60	8000	700
	1401-G	Y	$1900	5/64	600	150
	1410	Y	$12,000	11/61	760	110
	1440	Y	$3500	4/63	1375	800
	1460	Y	$9800	10/63	975	200
	1620 I, II	Y	$2500	9/60	1700	30
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	64	25
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	48	X
	7040	Y	$14,000	6/63	88	50
	7044	Y	$26,000	6/63	40	12
	705	N	$30,000	11/55	65	X
	7070, 2, 4	Y	$24,000	3/60	360	20
	7080	Y	$55,000	8/61	71	2
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	80	8
	7094	Y	$70,000	9/62	150	20
	7094 II	Y	$76,000	4/64	40	30
ITT	7300 ADX	Y	$18,000	7/62	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	510	155
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	265	115
	NCR - 390	Y	$1850	5/61	775	120
	NCR - 500	Y	$1500	9/65	0	130
Philco	1000	Y	$7010	6/63	15	0
	2000-210,211	Y	$40,000	10/58	19	3
	2000-212	Y	$52,000	1/63	5	2
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	558	40
	RCA 3301	Y	$11,500	7/64	15	33
	RCA 501	Y	$14,000	6/59	97	2
	RCA 601	Y	$35,000	11/62	4	1
	Spectra 70/15	Y	$2600	11/65	0	45
	Spectra 70/25	Y	$5000	11/65	0	25
	Spectra 70/45	Y	$9000	3/66	0	30
	Spectra 70/55	Y	$14,000	5/66	0	12
Raytheon	250	Y	$1200	12/60	160	15
	440	Y	$3500	3/64	9	11
Scientific Data Systems Inc.	SDS-92	Y	$900	2/65	0	22
	SDS-910	Y	$2000	8/62	110	30
	SDS-920	Y	$2700	9/62	70	8
	SDS-925	Y	$2500	12/64	1	10
	SDS-930	Y	$4000	6/64	13	20
	SDS-9300	Y	$7000	11/64	1	6
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	84	10
	File Computers	N	$15,000	8/56	22	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	320	X
	Solid-State II	Y	$8500	9/62	40	2
	418	Y	$11,000	6/63	9	7
	490	Y	$26,000	12/61	38	16
	1004	Y	$1900	2/63	2100	350
	1050	Y	$8000	9/63	130	210
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	24	5
	1108	Y	$50,000	7/65	0	13
	LARC	Y	$135,000	5/60	2	X
				TOTALS	24,642	9,481

X = no longer in production.

*To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

January 25 - February 12, 1965

	1964-65 High	1964-65 Low	3 weeks Sales In 100s	3 weeks High	3 weeks Low	Last	3 weeks Net Change	3 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	1781	53 1/2	49 1/4	50 1/2	+1 1/4	+2.54
American R & D	27 3/8	18 1/8	190	23 3/4	22	22 1/8	-1 1/2	-6.35
Burroughs	35 1/4	22 1/8	7101	35 1/4	30 1/2	34 1/2	+4 1/8	+13.58
Control Data	61 1/4	45 1/4	2506	60 3/4	56 1/2	57 1/2	---	---
Electronic Associates	27 3/8	16 7/8	529	19 1/8	16 7/8	17	-1 3/4	-9.33
General Dynamics	41 1/8	23 1/2	2436	38 1/8	35 7/8	37	---	---
General Electric	100 1/2	78 3/4	3257	100 1/2	95 5/8	96 1/4	-1 1/2	-1.53
General Precision	33 7/8	25 1/2	518	30 3/8	28	28 1/4	-7/8	-3.00
Honeywell	71 3/4	59 3/4	1493	71 3/4	63 1/4	68 1/2	+5 1/8	+8.09
IBM	494	404	886	450	437	440 7/8	-5 7/8	-1.32
Inter. Tel. and Tel.	63 7/8	52 5/8	1990	63 3/8	59 1/4	60 1/2	-2	-3.20
Litton Industries	85 1/2	58 1/4	2218	85 1/2	79 1/2	83 5/8	+3 7/8	+4.86
Nat. Cash Register	84 3/8	63	1062	80 1/4	75	79 1/8	+4	+5.32
Packard Bell	15 1/2	7	293	10 5/8	9 3/8	10	-1/2	-4.76
RCA	39 1/4	30	6807	32 5/8	31	31 3/8	-1 1/8	-3.46
Sperry Rand	21 3/4	12 3/4	5363	14 7/8	13 7/8	13 7/8	-1/4	-1.77
Xerox	131 7/8	70	4636	117 7/8	105 7/8	115 5/8	+8 3/4	+8.19
NYSE COMPUTER STOCK AVERAGE							+0.69	+0.46
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	1305	34 5/8	28 5/8	33 3/8	+4 3/4	+16.59
Bunker-Ramo	13 5/8	6 5/8	581	9 1/4	8 3/8	9	---	---
Clary	7 1/2	4 3/4	173	5 3/4	4 7/8	5 1/4	+3/8	+7.69
Computer Sciences	29 5/8	15 3/8	123	22 7/8	20 7/8	21 1/4	-7/8	-3.95
Potter Instrument	12 1/4	6	140	8 1/8	6 5/8	7 5/8	+3/4	+10.91
AMEX COMPUTER STOCK AVERAGE							+1.00	+6.25

	1965 High Bid	1965 Low Bid	Feb. 12 Bid	Feb. 12 Asked	3 weeks ago Bid
OVER-THE-COUNTER					
CEIR	8 7/8	7	8 7/8	9 5/8	7
Computer Control	12 7/8	10 3/4	11 5/8	12 3/4	11 5/8
Digitronics	6 5/8	5 3/8	5 3/8	6 1/8	6 1/8
Dura Corp.	34 5/8	28 1/8	31 3/4	33 3/4	32 1/2

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March 18, 1965 Vol.1., No. 16

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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GE ACCELERATES ITS DRIVE IN COMPUTER FIELD BY INTRODUCING NEW CARD SYSTEM AND STRENGTHENING 400 LINE.

General Electric covered a gap in its computer line last week by announcing the GE-115, a small card-oriented computer which competes with the IBM 360/20, Honeywell 120, NCR 500, and Univac 1004. Significantly, the creation of the new data processing system drew upon the capabilities of GE's recently acquired European computer partners, Compagnie Bull, General Electric of France, and Olivetti, General Electric of Italy, relying on Bull-GE for the card punch peripherals, and Olivetti-GE for the output printer, high-speed card reader, and central processor of the system.

The GE-115 offers a card processing system at an attractively low cost, e.g.,a 4K processor with a 300 lines-a-minute printer, 300 cards-a-minute reader, and a 60-200 cards-a-minute serial card punch rents for $1375.00 a month.....a price quite competitive with currently announced card systems, e.g., IBM 360/20 with its multi-function card machine and an equal memory rents for $ 1715.00 a month. The 115 uses a 4K or 8K memory with a cycle time of 8 msec. Word length is 8 bits.

Marketing responsibility for the GE-115 will be carried by both Bull-GE and Olivetti-GE in Europe, where first deliveries of the system will be made in December of this year. Since Bull and Olivetti were keen competitors on computer accounts prior to their collaboration with GE, it will be interesting to see how market territories for the GE computers will be allocated.

No immediate plans exist for producing the GE-115 processors in the U.S.; however, GE reports that the units will be manufactured in France and the U.S. as demand for the system develops. The American contribution to the GE-115 is the 300 cards-a-minute card reader developed at GE's Sunnyvale, California plant, and a DS-10 random access storage unit that holds two removable discs storing more than one million words each. This latter unit gives the GE-115 claim to being the lowest cost business data processing system with a bulk random access storage facility....an important feature for current users of card equipment for file maintenance applications.

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The GE-115 is also expected to find application as a remote terminal tied by communications lines to larger central computers, GE's choice of an 8-bit unit for data representation in the 115...in contrast to the 6-bit word used in their existing 200, 400, and 600 computer families...indicates that they foresee considerable use of the 115 in such multi-computer applications. The 8-bit word allows them to send data directly to competitive computers such as IBM's 360 and RCA Spectra 70's as well as their own equipment. The 115 is not, however, directly program compatible with current GE equipment nor with any competitive equipment.

Perhaps the key economic significance of the GE-115 is that it represents the first data processing system completely built by GE and its affiliates. Formerly, GE bought several of its peripheral units from firms such as IBM, Anelex, ICT, etc. Since about 70 % of the cost of a computer system such as the 115 is for peripherals, GE was previously unable to offer a reasonable EDP system renting for under $2000 a month at a reasonable profit. With the addition of the peripherals made by Bull-GE and Olivetti-GE, this is apparently now possible and it opens up a new market area for GE.

Expansion of 400 Line: GE has recently announced an upgrading of the capabilities of its Compatibles/400 computer family to make it more attractive to potential users - - particularly those interested in real-time business data processing systems.

The improvements included a 40% reduction in the memory cycle time of the 415, resulting from the use of a 5.8 usec. cycle time memory in place of the previous 9.2 usec. unit. This change makes the 415 just slightly slower than the 5.1 usec. cycle time memory of the 425, but over 20% less expensive...indicating that the 425 is being obsoleted and replaced in the 400 product line by the upgraded version of the 415.

To serve users who wish to run scientific as well as business applications, a floating point option is now available on the 400 line which, for example, permits the 415 to add two 24-bit words in 17 usec., multiply them in 21 usec., and divide them in 31 usec...making the 415 a very respectable performer on a range of scientific and engineering computations.

Six new peripheral devices were also announced to expand the capability of the 400 line. These were:

* A DS-15 random access storage unit which uses a removable high-density disc cartridge. Each removable disc holds 7.8 million 6-bit characters. The average access time is under 80 msec. The unit rents for $450 a month, making it more economical than IBM's similar 2311 disc storage drive ($575 per month). For the small- and medium-scale computer user the DS-15 is perhaps the most important bulk storage unit development in GE's history.

  Disc cartridge storage units are currently very popular -- for example, over 60% of the IBM 360/30 orders have at least one 2311 unit connected -- and the addition of DS-15 to GE's computer line should make their systems considerably more attractive to the small business user. The DS-15 is being built by GE in-house.

* DS-25 large capacity disc file storage system stores up to 800 million characters. Sixty-four simultaneous record "seek" operations are com-

bined with four concurrent data transfer operations to achieve what GE claims is the highest throughput of any large disc file in the industry. Rental for a 32 disc unit is $6,900 a month.

* A MD-30 magnetic drum which stores up to 12 million characters with an average access time of 8.5 msec. Rental is $4,000 a month.

* A MS-40 magnetic strip mass storage unit which provides access to over 532 million characters per unit or over 4 billion characters for a group of eight units under one controller. Average access time is 550 msec. This unit is supplied by IBM. It is called the IBM 2321 Data Cell Drive in the 360 line. Rental is $3,900 a month.

* A DATANET-21 high-speed single-line controller for handling data between several computers over communications lines at 40,800 bits per second. Rental is $200 monthly.

* A DATANET-70 multi-line controller which can handle simultaneously the access of up to 248 remote stations into a central computer via Teletype, Voicegrade and TELPACK communications facilities. Rental is $720 monthly.

Deliveries of the new units in the 400 line will begin in the fourth quarter of this year. The additions significantly expand the real-time and random access storage capability of GE's 400 line and should make it attractive to a wider range of computer users. To date, the sales of the 400 line have been somewhat disappointing with about 50 systems installed and 140 on order. An interesting development has been the dropping of the 1401 simulator which used a fixed-storage memory from the 400 line. GE apparently felt the software approach gave satisfactory results and saved the user extra rental charges.

Things to watch for in GE's drive to capture an increased share of the computer market in '65 are (1) further increases in the marketing force ... probably a 30%-40% increase during '65; (2) a transfer of a major section of GE's Phoenix-based Computer Department to the Midwest; (3) a continuing of the flow of top computer-oriented executives and marketing people from Univac to GE that started after the switch from Univac to GE of Dr. Louis Rader last year; and (4) a concentrated technical and marketing effort by GE in the manufacturing systems area where GE can offer not only its computer hardware but also its extensive skills in process automation.

DEVELOPMENT OF TIME-SHARED COMPUTER SYSTEMS: SOME COMMENTS

IBM made its first official move last week to regain face and grace in the time-shared computer systems field by introducing two new models of the System/360, the 64 and 66. This announcement came as no surprise to readers of our January, 29th issue where we reported, "It is likely that IBM will announce a new model with processing power between the 62 and 70 and with special features to enhance its attractiveness to the prospective user of a time-shared system....a market area where IBM has suffered some stunning and well-publicized set-backs in recent months, particularly to the GE 600 series. The new model will most likely offer a memory-centered processing capability which will allow more effective multiprocessing as well as an improved multi-segmented memory protection, allocation and control so that the machine can handle multiple users at remote consoles efficiently."

The new IBM time-sharing computers can link up to four processors, eight memories, and four channel controllers in a single configuration. The new memory allocation feature uses logic circuitry as an associative memory which keeps track of where blocks of information are located during actual processing. This allows the physical location of data in storage to be changed several times during the running of a single program without disrupting program execution.

The two systems use the same command structure as the rest of the 360 line plus extra instructions to direct the time-sharing features. Although the new processors can run 360 programs directly, these extra instructions require that programs prepared specifically for the new machines be re-compiled before operation on other members of the 360 line. The 64 uses the same two usec. memory as the model 60, and the 66 uses the same one usec. memory as the models 62 and 70.

There is no technical reason why other processors in the 360 line cannot be used in similar time-shared multi-system configurations. We understand that IBM has been quietly offering the models 33, 44, and 55 which use model 30, 40, and 50 proccessors respectively in multi-system configurations. On the blue sky end, we understand there is a model 99 made up of several model 92 processors interconnected by memory...for those with $500,000 a month to invest in computing power.

Rental prices on the 64 and 66 can range from $45,000 to $250,000 a month, depending on configuration. First deliveries can be made by mid-66.

The first customer for one of the new IBM time-shared systems is apparently Lincoln Labs which has ordered a 66 configuration renting for about $120,000 a month. The system is due for installation in the summer of '66 under a three year contract. A 360/62 will be installed this fall at the Labs for program development and systems check-out work.

With time-shared computer systems in operation or being planned for MIT, Dartmouth, Bell Labs, System Development Corp., and Carnegie Institute of Technology, time-sharing applications have found an articulate and aggressive group of supporters. But one should ask at this point,"Where is all the smoke coming from?"... from academic pipes?... from manufacturers anxious for the glamour associated with building avant-garde systems?... or from the knowledgeable users of business and scientific systems who must ultimately accept time-shared operations before the potential applications have any real impact? To get some feeling for the answer to this question, we surveyed the managers of a number of large computer installations using both scientific and business applications. What did we learn? In nearly every case the managers were aware of the technical potential of time-shared applications in meeting the computer requirements of their organization. However they felt the state-of-the-art was still three to five years removed from the point when they could confidently venture into the use of a time-shared computer application. Most of these users were themselves "pioneers" in the use of computer systems six to eight years ago and as one data processing manager put it, "We've learned that you can tell a pioneer by the arrow in his back!"

Besides the limited operating experience with time-shared systems, there is another obstacle to their acceptance in existing organizations. This is the political/social implications of the centralized computing and data processing

facility which a full-scale time-shared computer system operation implies. The heads of relatively autonomous divisions and departments cannot be expected to surrender easily the data processing "empires" they have developed to serve their operating groups. A vivid example of this phenomenon apparently occurred recently at the Northrop Corporation. GE landed a highly-publicized order for a 625 system at Northrop in January. The system was to serve as a central computer facility for the company's diversified aerospace, defense, and business operations throughout the U.S. and abroad. The rational was that the central facility could make available to anyone in the corporation, regardless of their physical location, the most advanced computing capability available, both in terms of hardware, software, and base data files. However, when the full implications of this change were realized by operating management at the various divisions of Northrop, the company's "Czar of Data Processing" Milton Stone was squeezed out and the GE order was put under "re-evaluation."

Perhaps the single significant message for the computer manufacturer uncovered in our survey was that most of these users were looking for time-shared operating capability in the new computers they are evaluating. For example, Sun Oil recently ordered a GE 600 series computer to tie-in the company's corporate center in Philadelphia to its refinery in Marcus Hook, Pa. by a direct data communications link. This will allow people at the Philadelphia office to program and operate the computer located at Marcus Hook on an on-line basis. Although full time-shared operations are not planned on the GE system in the near future, it was to a large extent its ability to handle this mode of operation which gave the contract to GE rather than the two other leading contenders, IBM and Control Data.

The key technical limitations to time-shared systems at present are unproven software and the high cost of terminal stations. For really widespread use of time-shared systems, remote 110 terminals costing between $5,000 and $10,000 are needed. Current terminals with keyboard input and graphic display capability are $40,000 - $50,000 each. Another consideration is that most current input stations require input by typewriter-like keyboards. There are, however, only a small percentage of individual computer users, such as programmers and research workers, who can type with reasonable speed and accuracy. Some form of graphic input station would seem needed before time-shared systems can achieve practical acceptance by these type of users.

NOTES FROM THE EDITOR'S SCRATCHPAD

Burroughs: Reduction in sales force and concentration on coordinated product marketing to key accounts should help Burroughs stretch its profit margin on computers. Company lands $10 million in new computer orders in first two months of this year - compared to $95 million last year (including 151 B263's leased to Air Force) - and finds that 25% of the new business comes from current customers for upgrading memories and peripherals at their installations. Three year lease arrangement being pushed on B200, B300, and B5000/5500 systems.... deal offers 25% rental discount over month-by-month plans. Burroughs finds that long term lease customers don't have the economic and psychological leverage to "squeeze us dry for extra support and services that drain any reasonable return on our investment." Reports are that the 25% discount is attractive enough with controllers to win high number of commitments.

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF FEBRUARY 28, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	22	0
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	0	4
	ASI 6040	Y	$2800	7/65	0	3
Autonetics	RECOMP II	Y	$2495	11/58	58	X
	RECOMP III	Y	$1495	6/61	15	X
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	7	2
	BR-300	Y	$3000	3/59	40	X
	BR-330	Y	$4000	12/64	34	X
	BR-340	Y	$7000	12/63	24	10
	BR-530	Y	$6000	8/61	14	X
Burroughs	205	N	$4600	1/54	61	X
	220	N	$14,000	10/58	39	X
	E101-103	N	$ 875	1/56	100	X
	B100	Y	$2800	8/64	25	28
	B250	Y	$4200	11/61	96	5
	B260	Y	$3750	11/62	128	112
	B270	Y	$7000	7/62	124	21
	B280	Y	$6500	7/62	62	28
	B370	Y	$8400	7/65	0	25
	B5000/B5500	Y	$20,000	3/63	35	3
Clary	BE-60/DE-60M	Y	$525	2/60	300	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	52	12
	DDP-116	Y	$900	3/65	0	24
	DDP-224	Y	$3300	3/65	1	13
Control Data Corporation	G-15	N	$1000	7/55	325	X
	G-20	Y	$15,000	4/61	28	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61/3/64	418	7
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	5	20
	3200	Y	$12,000	5/64	34	31
	3300	Y	$15,000	7/65	0	30
	3400	Y	$25,000	11/64	4	16
	3600	Y	$58,000	6/63	36	15
	3800	Y	$60,000	5/65	0	16
	6400	Y	$40,000	12/65	0	1
	6600	Y	$110,000	8/64	2	6
	6800	Y	$140,000	4/67	0	1
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	54	6
	PDP-5	Y	$900	9/63	99	9
	PDP-6	Y	$10,000	10/64	4	8
	PDP-7	Y	$1300	11/64	5	17
	PDP-8	Y	$525	4/65	0	85
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Friden	6010	Y	$600	6/63	185	150
General Electric	115	Y	$1700	12/65	0	3
	205	Y	$2900	10/64	15	15
	210	Y	$16,000	7/59	57	X
	215	Y	$5500	11/63	39	8
	225	Y	$7000	1/61	136	4
	235	Y	$10,900	12/63	33	11
	415	Y	$5500	5/64	33	80
	425	Y	$7500	7/64	15	44
	435	Y	$12,000	10/64	6	21
	455	Y	$18,000	6/65	0	2
	465	Y	$24,000	6/65	0	1
	625	Y	$50,000	12/64	1	15
	635	Y	$65,000	12/64	1	17
General Precision	LGP-21	Y	$725	12/62	143	X
	LGP-30	semi	$1300	9/56	430	X
	RPC-4000	Y	$1875	1/61	98	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	70
	H-200	Y	$6000	3/64	250	550
	H-300	Y	$3900	7/65	0	10
	H-400	Y	$8500	12/61	108	5
	H-800	Y	$22,000	12/60	70	15
	H-1200	Y	$6500	2/66	0	10

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd.)	H-1400	Y	$14,000	1/64	9	2
	H-1800	Y	$30,000	1/64	5	8
	H-2200	Y	$11,000	10/65	0	25
	H-4200	Y	$16,800	2/66	0	3
	DATAmatic 1000	N	$40,000	12/57	3	X
H-W Electronics, Inc.	HW-15X	Y	$490	6/63	3	X
IBM	305	N	$3600	12/57	195	X
	360/20	Y	$1800	12/65	0	1400
	360/30	Y	$4800	5/65	0	2200
	360/40	Y	$9600	5/65	0	570
	360/50	Y	$18,000	7/65	0	255
	360/60	Y	$35,000	8/65	0	48
	360/62	Y	$50,000	9/65	0	21
	360/70	Y	$80,000	10/65	0	62
	650-card	N	$4000	11/54	275	X
	650-RAMAC	N	$9000	11/54	50	X
	1130	Y	$900	11/65	0	350
	1401	Y	$4500	9/60	8100	660
	1401-G	Y	$1900	5/64	650	150
	1410	Y	$12,000	11/61	765	105
	1440	Y	$3500	4/63	1430	760
	1450	Y	$9800	10/63	1000	195
	1620 I, II	Y	$2500	9/60	1700	30
	1800	Y	$6500	2/66	0	45
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	65	25
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	47	X
	7040	Y	$14,000	6/63	90	48
	7044	Y	$26,000	6/63	41	10
	705	N	$30,000	11/55	64	X
	7070, 2,4	Y	$24,000	3/60	364	16
	7080	Y	$55,000	8/61	71	2
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	80	8
	7094	Y	$70,000	9/62	145	15
	7094 II	Y	$76,000	4/64	45	26
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	518	150
National Cash Register	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	275	110
	NCR - 390	Y	$1350	5/61	795	95
	NCR - 500	Y	$1500	9/65	0	145
Philco	1000	Y	$7010	6/63	15	0
	2000 - 210, 211	Y	$40,000	10/58	19	3
	2000 - 212	Y	$52,000	1/63	5	2
	2000 - 213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	x
	RCA 301	Y	$6000	2/61	565	35
	RCA 3301	Y	$11,500	7/64	17	31
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	4	1
	Spectra 70/15	Y	$2600	11/65	0	48
	Spectra 70/25	Y	$5000	11/65	0	30
	Spectra 70/45	Y	$9000	3/66	0	38
	Spectra 70/55	Y	$14,000	5/66	0	12
Raytheon	250	Y	$1200	12/60	165	10
	440	Y	$3500	3/64	9	13
Scientific Data System Inc.	SDS-92	Y	$900	3/65	0	25
	SDS-910	Y	$2000	8/62	113	26
	SDS-920	Y	$2700	9/62	73	8
	SDS-925	Y	$2500	12/64	1	14
	SDS-930	Y	$4000	6/64	18	20
	SDS-9300	Y	$7000	11/64	1	7
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	85	9
	File Computers	N	$15,000	8/56	22	X
	Solid-State 80, 90, & Step	Y	$8000	8/58	312	X
	Solid State II	Y	$8500	9/62	40	2
	418	Y	$11,000	6/63	12	8
	490	Y	$26,000	12/61	40	15
	1004	Y	$1900	2/63	2120	310
	1050	Y	$8000	9/63	135	205
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	24	4
	1108	Y	$50,000	7/65	0	14
	LARC	Y	$135,000	5/60	2	X
				TOTALS	25,051	10,036

X = no longer in production.

*To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

February 15 - February 26, 1965

	1964-65 High	1964-65 Low	2 weeks Sales in 100s	2 weeks High	2 weeks Low	Last	2 weeks Net Change	2 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 7/8	40 3/8	834	55	49 3/4	54 1/4	+3 3/4	+7.42
American R & D	27 3/8	18 1/8	131	23 3/4	22 1/8	23 5/8	+1 1/2	+2.83
Burroughs	35 5/8	22 1/8	2989	35 5/8	32 1/4	33 3/8	-1 1/8	-3.26
Control Data	62 3/4	45 1/4	2829	62 3/4	55 1/2	62 1/4	+4 3/4	+8.27
Electronic Associates	27 3/8	16 3/4	422	19 1/2	16 3/4	19 1/2	+2 1/2	+14.69
General Dynamics	41 1/8	23 1/2	3180	46 1/8	37 1/8	38 1/8	+1 1/8	+3.02
General Electric	100 1/2	78 3/4	1704	100	94 5/8	99 7/8	+3 5/8	+3.79
Honeywell	75	59 3/4	957	75	67 3/4	71 5/8	+3 1/2	+5.12
IBM	494	404	803	457 1/8	425	455 3/4	+14 7/8	+3.37
Inter. Tel. and Tel.	63 7/8	52 5/8	845	61 7/8	59 1/8	61 1/2	+1	+1.65
Litton Industries	88	58 1/4	933	88	82 3/4	87 3/8	+3 3/4	+4.48
Nat. Cash Register	84 3/8	63	653	79 5/8	77 3/8	78 7/8	-1/4	-.32
RCA	39 1/4	30	4331	32 1/4	31	32	+5/8	+6.25
Raytheon	27	17 1/8	828	25 1/8	22 5/8	23 7/8	+1 1/4	+5.51
SCM	21 3/8	13 1/2	685	21 1/8	20 1/8	20 3/8	----	----
Singer	100 3/4	78 1/8	454	83 1/4	81	81 1/8	-1/2	-.61
Sperry Rand	21 3/4	12 3/4	3419	14 7/8	13 3/4	14 7/8	+1	+7.21
NYSE COMPUTER STOCK AVERAGE							+2.43	+4.08
AMERICAN STOCK EXCHANGE								
ANelex	44	22 7/8	564	35 1/8	31 1/2	34 3/4	+1 3/8	+4.12
Bunker-Ramo	13 5/8	6 5/8	403	9 3/8	8 3/4	8 7/8	-1/8	-1.39
Cal Comp	24	17 1/4	216	21 7/8	17 1/4	18 1/4	-2 3/4	-13.21
Clary	7 1/2	4 3/4	88	5 1/4	4 7/8	5	-1/4	-4.76
Computer Sciences	37 3/4	15 3/8	1493	37 3/4	21 1/4	37 3/4	+16 1/2	+77.63
Planning Research	19 3/4	10	323	19 3/4	17 3/8	19	+1 1/4	+7.05
Potter Instrument	12 1/4	6	126	9	7 5/8	8 5/8	+1	+13.11
AMEX COMPUTER STOCK AVERAGE							+2.43	+11.79

	1965 High Bid	1965 Low Bid	February 26 Bid	February 26 Asked	2 weeks ago Bid
OVER-THE-COUNTER					
CEIR	9 5/8	7	9 3/8	9 5/8	8 7/8
Computer Usage	16 3/4	13 1/4	16 3/4	18 3/8	13 1/2
Computer Control	13 1/4	10 3/4	12 5/8	13	11 5/8
Digitronics	6 5/8	5	5 1/4	5 5/8	5 3/8
Dura Corp.	34 5/8	28 1/8	31	31 1/2	31 3/4
Scientific Data	36 1/2	31 3/4	36 1/2	37 1/2	33

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April 27, 1965 Vol 1., No. 17

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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Telephone 617-332-8840

EUROPEAN COMPUTER MARKET GROWS BY NEARLY 50% IN '64 ACCORDING TO NEW STUDY

The number of digital computers installed in Western Europe increased nearly 50% during 1964, from 3919 installed at the end of 1963 to 5889 computers installed at the end of 1964, representing an installed value of over $1.7 billion, according to a comprehensive market report recently released. The report entitled "European Computer Survey 1965" was prepared by Computer Consultants Ltd., a leading British consulting firm.

During the same period existing orders for computer systems in Western Europe also increased by nearly 50%, from 2335 to 3485. These remarkable increases make Western Europe the fastest growing major market for computer systems in the world today. Although the number of computers in Western Europe is only about 30% of the estimated 18,000 computers in the United States (about 28% by value), most experts predict that at the European market's current growth rate, it should equal the U.S. market in number of computers installed by 1975.

American computer technology and marketing skill have captured the major share of the European computer market. This is clearly evidenced by the fact that 25% of the computers now installed in Western Europe were manufactured in the United States and another 54% were manufactured in Western Europe by American firms or American licensees. Only 21% of Western Europe's current computing power has been manufactured by independent European concerns.

The statistics on computer systems on order in Western Europe show that American firms are planning to build a larger share of the computers they'll supply to Western Europe in Western Europe. Of these computers on order, only 17% are expected to be manufactured in the United States while 61% will be manufactured in Western Europe, a change from the 25%-54% ratio previously mentioned. Only 22% of the computers currently on order in Western Europe are to be built by independent European firms.

This on order situation is of course subject to change as countries vary their import taxes and requirements (e.g. Britian's recent 15% surcharge on imports of equipment such as computers). However outside of Great Britain which currently supplies 54% of its own computer needs, the other countries of Western Europe do not have a very developed indigenous computer manufacturing capability.

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For example, French firms have built only 16% of the computers France uses (even when the Bull computers built prior to the GE investment are counted as wholly French), and German firms have built only 9% of Germany's installed computers. So it is difficult to envision how many Western European countries will be able to develop the ability to supply a significant share of their own computer needs in the near future.

Of $1.3 billion worth of American-made or American-licensed computers installed in Western Europe, IBM's share is a whooping 81.9%. Univac is second with 8.9%. Third is RCA with 5.4% (largely represented by its 301's sold through Bull in France as the Gamma 30 and through ICT in England as the 1500), followed by NCR with 1.6%, Control Data with 1.0%, Honeywell with 0.6%, Burroughs with 0.4% and General Electric with 0.2%.

The chart below gives a breakdown of computers installed by country at the end of 1963 and 1964, as well as the value of computers installed at the end of 1964. The figures are taken from the "European Computer Survey 1965" prepared by Computer Consultants Ltd. of England and available in the United States from the International Data Corporation, P.O. Box 1, Newtonville, Mass. 02160. The price is $285 per copy.

	COMPUTERS INSTALLED			COMPUTERS ON ORDER		
COUNTRY	NUMBER (END OF 1963)	NUMBER (END OF 1964)	VALUE (END OF 1964) ($MILLIONS)	NUMBER (END OF 1963)	NUMBER (END OF 1964)	VALUE (END OF 1964) ($MILLIONS)
Austria	66	108	23.4	50	68	15.8
Belgium	142	232	53.2	105	127	34.8
Denmark	74	95	23.3	30	57	15.8
Finland	19	54	12.5	35	59	12.5
France	791	1084	345.6	406	526	125.0
Germany	993	1413	394.8	455	867	191.6
Gr. Britain	626	948	296.1	381	754	230.0
Greece	50	67	17.8	20	47	10.5
Irish Rep.	10	41	11.1	39	37	6.9
Italy	592	882	278.5	339	295	95.3
Netherlands	156	275	81.1	134	188	75.7
Norway	54	109	22.7	71	78	14.9
Portugal	16	29	11.2	29	37	7.6
Spain	23	38	10.1	19	78	16.1
Sweden	147	257	76.6	121	120	37.4
Switzerland	160	257	76.9	101	147	40.1
TOTALS	3,919	5,889	$1,734.5	2,335	3,485	$929.9

IBM CANS THREE SLOW SELLING MODELS AT HIGH END OF SYSTEM/360 IN FAVOR OF TWO NEW PROCESSORS

IBM took a bold step last week to bolster the competitive position of the high end of its System/360 by introducing two new processors, the Models 65 and 75, designed to replace the three largest models originally announced with the 360 line, the Models 60, 62, and 70.

The Model 65 supersedes the Models 60 and 62. It offers a processing speed about 40% faster than the Model 60 and about 25% faster than the Model 62 at equivalent costs. The Model 75 supersedes the Model 70. It offers a processing speed about 20% faster than the Model 70 at equivalent costs. Both new models offer up to one million characters of core storage with a .75 usec. cycle time, compared with the half million character limit and slower access times of the memories of the superseded processors. Main memory cycle time is 2 usec. for the Model 60, and 1 usec. for the Models 62 and 70. The Model 65 offers two-way and the Model 75 offers four-way memory interleaving to decrease access times by another 25-30%. First deliveries of the Model 65 will be in the first quarter of next year. Existing orders for Models 60 and 62 due for installation in the last quarter of this year will be honored, reports IBM. These few installations (perhaps 10-15) will have their processors converted to the Model 65 during the first quarter of next year. The Model 75 will be installed in the last quarter of this year, substituting for any Model 70 installations due at that time.

In the year since their announcement, the Models 60, 62 and 70 have been sluggish performers in the sales picture for the 360, probably falling considerably below IBM's sales projections. According to our latest computer census figures, orders for the Models 30, 40 and 50 amount to a total value of $1,080 million, while orders for Models 60, 62 and 70 amount to only $411 million. This is largely because the primary market for these systems is among existing users of large-scale computers...and these sophisticated customers have been reluctant to undertake the investment required to replace their existing system unless a significant improvement in price/performance can be gained immediately and the new system can offer the potential for expansion considerably beyond these users' current computer capacity. Memory size and memory speed are two of the critical factors in assessing this computer growth potential. IBM's new 360 processors offer a sharply improved answer to these user demands than did the Models 60, 62, or 70. GE's 600 series, Control Data's 3000 series, and Univac's 1108 have been able to capture a number of significant computer orders...several of them from existing IBM 7090 series customers...because they have offered high performance in the scientific area and system expansibility at prices considerably below IBM's. This price/performance gap has been virtually closed by IBM's new processors.

IBM's Model 65 can be incorporated into a multi-processor configuration for time-sharing applications. This configuration is called the Model 67, and this model supersedes the Models 64 and 66 announced only seven weeks ago...probably setting a new record for the public half-life of a never-to-be-built computer. The same special instructions and multi-segmented memory allocation feature announced for the Models 64 and 66 will be available on the Model 67. The Model 66, in its short life, achieved orders at the Lincoln Labs and the Univ. of Michigan. A Model 64 is on order at System Development Corporation. The Model 67 will be the substitute processor for these orders, with a first delivery expected in the summer of 1966. The Model 67 is offered on a special bid basis, with the rental range being $45,000 to $250,000 per month. Prime competitive impact of this system will be against GE's 600 series.

Backing up the mass memory requirements of its new processors, IBM has also introduced a new mass memory unit composed of replaceable modules. Called the IBM 2314 direct access storage facility, the new unit can store up to 207 million characters in a system of eight disc packs. Each disc pack, consisting of 11 individual discs, can be removed and another substituted in its place. The 2314's

replaceable module feature should win for it an important place in some time-sharing systems and in data communications applications such as message switching, reservation systems, utility billing, etc. The 2314 rents for $5250 a month, and first deliveries are schedules for the first quarter of '67.

Low End Improvements: In the midst of upgrading the high end of its 360 line, IBM has not been neglecting performance improvements on the low end. Probably the most significant recent announcement in this area is the introduction of a 2540 card read/punch unit which will replace the familiar 1402 card I/O unit in the 360 line. The 2540 reads at 1000 cards a minute compared to 600 for the 1402; it punches at 300 cards a minute compared to 250 for the 1402. The 2540's price is identical to the 1402...$660 a month. It is available on the 360 Models 30 through 75. Since most business applications on computers such as the Models 30 and 40 are input/output limited, the 2540 should add significantly to the price/performance of these two low end models. The 2540 will not be available on 1400 or 7000 series computers.

Also announced for the low end of the 360 is a new low-cost magnetic tape unit for the Models 20 and 30. Called the 2415, the unit has a transfer rate of 15 kc at 800 bpi. The unit offers a read tape backwards feature and rents in a two tape unit for only $750 per month.

Significantly, this unit allows tapes to be added to a Model 20 system. The Model 20 was previously available with a disc cartridge memory only. A typical Model 20 system, with four 2415 tapes, rents for $3,190 a month, the lowest price at which an IBM magnetic tape computer has ever been offered. First deliveries of the 2415 tape units are not scheduled, however, until the fall of next year.

UNIVAC INTRODUCES MULTI-FUNCTION CARD UNIT FOR 1004

When the IBM 360/20 was introduced last November, many people predicted dark days for the Univac 1004. The Model 20, when used with the IBM 2560 multi-function card machine, which can collate, reproduce, gangpunch, summary punch, and/or list a set of punched cards, looked like too much machine for the 1004 to compete against effectively. However Univac has succeeded in expanding the memory of the 1004, and hooking up magnetic tape transports and data communications equipment to it, until the 1004 now looks more like a full-capacity computer system than a plug-board programmed card processor. Univac's most recent step is to introduce a multi-function card handling unit of their own, which not only edits, collates and/or sorts cards, but also can do some independent arithmetic processing.

Called the Univac 1001 Card Controller, the unit can handle up to 2000 cards per minute, collating them at speeds up to 50% faster than units available today. When directly linked to the 1004, the 1001 is said to effectively double the processing capacity of the 1004. Operating independently, the 1004 and 1001 can process various parts of the same job simultaneously, or operate on two different jobs simultaneously.

Deliveries on the Univac 1001 are scheduled for Jan. '66. Its rental price starts at $450 per month, suggesting that the 1001 will add about 25% to the cost of existing 1004 installations. Perhaps the 1001's most significant impact will be to persuade current 1004 users to keep their systems in place for a longer

period rather than switch to one of a low-cost card computer such as the IBM Model 20, or the newly announced GE 115 or Honeywell 120.

COMPUTER APPLICATIONS GAINS AMEX LISTING; REPORTS 60% EARNINGS INCREASE IN FIRST QUARTER.

Computer Applications, Inc., a four-year-old firm which has developed a $5,000,000 annual business in computer programming and data processing services, had its common stock approved for listing on the American Stock Exchange last week. In doing so, it became the third firm specializing in computer software services to be listed on AMEX. The others are Planning Research and Computer Sciences Corp. Two other large software companies, C-E-I-R, Inc. and Computer Usage, are traded over-the-counter.

Between them, these five firms are expected to share between $80,000,000 and $90,000,000 worth of business in programming and data processing services this year. 1965 should be a particularly favorable year for software firms because of the heavy volume of computer system study contracts being let by users evaluating new computers as well as software development contracts from manufacturers bent on supporting their third-generation computer systems with advanced software support.

Of these firms, Computer Applications has had, perhaps, the most conspicuous growth by acquisition. Last year, CAI acquired three companies - Orchard-Hays & Company, Inc., Silver Spring, Maryland; Suburban Data Processing Center, Inc., Fairfield, New Jersey; and the New Jersey data processing operations of Conroy-Smith & Co. These acquisitions resulted in the near-doubling of sales from $2.8 million in Fiscal '63 to $4.9 million in Fiscal '64, ended September 30, and a corresponding increase of 123% in net earning after taxes from $154,268 (23¢/share) to $344,411 (48¢/share) last year.

Headed by highly-respected software expert John DeVries, CAI continues to move along on its growth-by-acquisition course. A few months ago, CAI completed the acquisition of Computer Concepts, Inc. of Silver Spring, Maryland, a relatively large computer programming and analysis organization which has specialized in war-gaming, management reporting systems, language translation, and other specialized areas of data processing. This acquisition resulted in a staff of nearly 100 employees for CAI in the Washington market for data processing services... an area which competitors such as C-E-I-R and Computer Usage have found lucrative in the past.

More recently, CAI acquired the assets of Tape Converter Services, Inc. of New York and EMAC Data Processing Corporation of Woodside, New York and has announced plans to acquire Associated Sales Analysts, Inc. of New York City, to expand CAI's New York City-based data processing center facilities.

Although the company was heavily committed to programming and data processing services for the government's space program in its earlier days (government business accounted for 40% of sales in Fiscal '64), CAI appears to be successfully acquiring the data processing facilities necessary to offer commercially many of the programs and programming skills they have matured under government contracts.

Gross revenues for the first quarter of Fiscal '65 were $2,050,000 compared to $860,000 in the year earlier period. Net earnings after taxes during the quarter

(Continued on Page 8)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF APRIL 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	22	2
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	0	4
	ASI 6040	Y	$2800	7/65	0	4
	ASI 6050	Y	$3000	10/65	0	0
	ASI 6070	Y	$3500	10/65	0	0
	ASI 6080	Y	$4000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	57	x
	RECOMP III	Y	$1495	6/61	15	x
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	13	1
	BR-300	Y	$3000	3/59	40	x
	BR-330	Y	$4000	12/60	35	x
	BR-340	Y	$7000	12/63	18	5
	BR-530	Y	$6000	8/61	15	x
Burroughs	205	N	$4600	1/54	58	x
	220	N	$14,000	10/58	44	x
	E101-103	N	$875	1/56	169	x
	B100	Y	$2800	8/64	33	35
	B250	Y	$4200	11/61	96	10
	B260	Y	$3750	11/62	145	120
	B270	Y	$7000	7/62	130	25
	B280	Y	$6500	7/62	65	25
	B370	Y	$8400	7/65	0	18
	B5000/B5500	Y	$20,000	3/63	35	13
Clary	DE-60/DE-60M	Y	$525	2/60	305	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	x
	DDP-24	Y	$2500	5/63	55	18
	DDP-116	Y	$900	4/65	1	32
	DDP-224	Y	$3300	3/65	2	30
Control Data Corporation	G-15	N	$1000	7/55	325	x
	G-20	Y	$15,500	4/61	28	x
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	422	5
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	x
	3100	Y	$7350	12/64	10	25
	3200	Y	$12,000	5/64	37	25
	3300	Y	$15,000	7/65	0	33
	3400	Y	$25,000	11/64	5	17
	3600	Y	$58,000	6/63	38	15
	3800	Y	$60,000	5/65	0	17
	6400	Y	$40,000	12/65	0	2
	6600	Y	$110,000	8/64	4	5
	6800	Y	$140,000	4/67	0	1
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	6
	PDP-5	Y	$900	9/63	103	5
	PDP-6	Y	$10,000	10/64	5	8
	PDP-7	Y	$1300	11/64	10	30
	PDP-8	Y	$525	4/65	0	120
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	x
Electronic Associates, Inc.	8400	Y	$9000	6/65	0	6
Friden	6010	Y	$600	6/63	200	140
General Electric	115	Y	$1375	12/65	0	45
	205	Y	$2900	6/64	16	15
	210	Y	$16,000	7/59	56	x
	215	Y	$6000	9/63	44	5
	225	Y	$8000	4/61	138	4
	235	Y	$10,900	4/64	38	12
	415	Y	$7300	5/64	40	85
	425	Y	$9600	6/64	20	50
	435	Y	$14,000	4/64	1	22
	625	Y	$41,000	12/64	2	16
	635	Y	$45,000	12/64	2	18
General Precision	LGP-21	Y	$725	12/62	143	x
	LGP-30	semi	$1300	9/56	430	x
	RPC-4000	Y	$1875	1/61	98	x

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	150
	H-200	Y	$4500	3/64	370	380
	H-400	Y	$8500	12/61	110	3
	H-800	Y	$22,000	12/60	75	11
	H-1200	Y	$6500	2/66	0	18
	H-1400	Y	$14,000	1/64	9	2
	H-1800	Y	$30,000	1/64	5	8
	H-2200	Y	$11,000	10/65	0	30
	H-4200	Y	$16,800	2/66	0	4
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3600	12/57	185	X
	360/20	Y	$1800	12/65	0	2000
	360/30	Y	$4800	4/65	0	2300
	360/40	Y	$9600	4/65	0	590
	360/50	Y	$18,000	7/65	0	270
	360/60	Y	$35,000	8/65	0	55
	360/62	Y	$50,000	9/65	0	22
	360/70	Y	$80,000	10/65	0	65
	650-card	N	$4000	11/54	270	X
	650-RAMAC	N	$9000	11/54	50	X
	1130	Y	$900	11/65	0	410
	1401	Y	$4500	9/60	8250	550
	1401-G	Y	$1900	5/64	800	100
	1410	Y	$12,000	11/61	780	100
	1440	Y	$3500	4/63	1500	700
	1460	Y	$9800	10/63	1100	150
	1620 I, II	Y	$2500	9/60	1700	30
	1800	Y	$6500	2/66	0	55
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	68	25
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	47	X
	7040	Y	$14,000	6/63	93	45
	7044	Y	$26,000	6/63	45	10
	705	N	$30,000	11/55	64	X
	7070, 2, 4	Y	$24,000	3/60	365	12
	7080	Y	$55,000	8/61	71	2
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	75	5
	7094	Y	$70,000	9/62	140	20
	7094 II	Y	$76,000	4/64	55	30
ITT	7300 ADX	Y	$18,000	9/61	9	5
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	520	150
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	300	60
	NCR - 315 - RMC	Y	$12,000	9/65	0	50
	NCR - 390	Y	$1850	5/61	850	90
	NCR - 500	Y	$1500	9/65	0	150
Philco	1000	Y	$7010	6/63	16	2
	2000-210, 211	Y	$40,000	10/58	21	2
	2000-212	Y	$52,000	1/63	8	3
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	575	30
	RCA 3301	Y	$11,500	7/64	21	26
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	4	1
	Spectra 70/15	Y	$2600	11/65	0	60
	Spectra 70/25	Y	$5000	11/65	0	40
	Spectra 70/45	Y	$9000	3/66	0	50
	Spectra 70/55	Y	$14,000	5/66	0	15
Raytheon	250	Y	$1200	12/60	170	10
	440	Y	$3500	3/64	10	10
Scientific Data Systems Inc.	SDS-92	Y	$900	4/65	1	35
	SDS-910	Y	$2000	8/62	120	20
	SDS-920	Y	$2700	9/62	78	8
	SDS-925	Y	$2500	12/64	1	25
	SDS-930	Y	$4000	6/64	31	20
	SDS-9300	Y	$7000	11/64	9	7
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	88	5
	File Computers	N	$15,000	8/56	22	X
	Solid State 80 I,II, 90 I,II & Step	Y	$8000	8/58	340	X
	418	Y	$11,000	6/63	15	10
	490	Y	$26,000	12/61	42	15
	1004	Y	$1900	2/63	2200	250
	1050	Y	$8000	9/63	145	195
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	25	3
	1108	Y	$50,000	7/65	0	17
	LARC	Y	$135,000	5/60	2	X
				TOTALS	26,065	10,601

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

March 1 - April 16, 1965

	1965 High	1965 Low	7 weeks Sales in 100s	7 weeks High	7 weeks Low	Last	7 weeks Net Change	7 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	55 7/8	46 1/2	1933	54 1/2	50 5/8	52	-2 1/4	-4.15
American R & D	25 1/2	21 1/8	570	24 1/8	21 5/8	23	-5/8	-2.64
Burroughs	39	24 7/8	8920	39	31 3/8	37 7/8	+4 1/2	+13.48
Control Data	64 1/4	53 1/4	4326	64 1/4	53 1/2	55 5/8	-6 5/8	-10.06
Electronic Associates	21 3/8	16 3/4	2293	21 3/8	17 5/8	21	+1 1/2	+7.69
General Dynamics	43 1/4	35	6841	43 1/4	36	43 1/8	+5	+13.15
General Electric	104 3/8	91	5325	104 3/8	98 1/4	103	+3 1/8	+3.13
Honeywell	75 3/8	59 3/4	2370	75 3/8	68	74 1/8	+2 1/2	+3.49
IBM	475	404	1847	475	451	472	+16 1/4	+3.64
Inter. Tel.and Tel.	63 7/8	56 3/8	3057	61 1/2	56 3/8	57 3/4	-3 3/4	-6.09
Litton	89 7/8	58 1/4	3555	89 7/8	82 1/2	88 1/8	+3/4	+0.86
Nat. Cash Register	83 7/8	74	2137	83 7/8	78	80 5/8	+1 3/4	+2.22
RCA	35 7/8	31	18,900	35 7/8	31 1/2	35 3/8	+3 3/8	+10.05
Raytheon	25 3/8	21 3/8	1832	25 3/8	22 1/8	22 1/2	-1 3/8	-5.76
SCM	22 3/8	17 1/8	3220	22 3/8	18 7/8	21 7/8	+1 1/2	+7.39
Singer	83 1/4	75 5/8	3354	82 3/4	75 5/8	81 1/8	----	----
Sperry Rand	15 3/4	13 3/8	14,558	15 3/4	13 3/8	13 3/8	-1 1/2	-10.01
NYSE COMPUTER STOCK AVERAGE							+1.43	+1.55
AMERICAN STOCK EXCHANGE								
ANelex	39	25 1/4	2133	39	30 1/2	33 3/8	-1 3/8	-3.96
Bunker-Ramo	9 1/2	7 7/8	1303	9 1/2	8	8 5/8	-1/4	-2.82
Cal Comp	24	14 3/4	447	19	14 3/4	15 3/4	-2 1/2	-13.69
Clary	6 1/8	4 3/4	618	6 1/8	5 1/8	5 3/8	+3/8	+7.50
Computer Sciences	48 3/4	19 5/8	3285	48 3/4	34 5/8	48 5/8	+10 7/8	+28.95
Planning Research	27 1/2	12 1/8	906	27 1/2	19	27 1/4	+8 1/4	+43.37
Potter Instrument	9	6 5/8	255	9	7 1/4	8 3/8	-1/4	-2.92
AMEX COMPUTER STOCK AVERAGE							+2.02	+8.03

	1965 High Bid	1965 Low Bid	April 16 Bid	April 16 Asked	7 weeks ago Bid
OVER-THE-COUNTER					
CEIR	11 3/8	7	10 1/2	10 3/4	9 3/8
Computer Usage	26 1/4	13 1/4	26 1/4	28 1/2	16 3/4
Computer Control	17 1/8	10 3/4	17	17 1/4	12 5/8
Digitronics	6 3/4	5	5 3/4	6 1/8	5 1/4
Scientific Data	44 3/4	31 3/4	44	44 3/4	36 1/2

(con't from page 5)
were $124,000 (16¢/share) versus $68,500 (10¢/share) in the corresponding quarter last year.

On the basis of its current momentum, we estimate CAI will reach $10-11 million in consolidated gross revenues during its current fiscal year, while net earnings after taxes should be in the neighborhood of 65¢/share.

RUMOR MILL:

Current trade whispers are that Bunker-Ramo's process control computer activity will be taken over by GE's process control group in Phoenix within a few weeks. GE is said to be interested in continuing B-R's relationship with Computer Control on their 116 computer which is currently being supplied to B-R for use as the central processor in their BR-335 on-line electronic information system. The next speculation seems to be whether 3C's capability for developing and building systems computers in the small- and medium-scale area will complement GE's own enough to evolve an arrangement into a marriage.

May 31, 1965 Vol 1., No. 18

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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TWO OUT, TWO IN--ELECTRONIC ASSOCIATES, SYSTEMS ENGINEERING LABS ARE NEW FACES IN THE GP DIGITAL COMPUTER FIELD; GENERAL PRECISION, UNION CARBIDE BOW OUT.

The gate to the computer business is clearly doubled hinged...and in recent months it has been well exercised. We'll review the position of four firms who have recently moved through this gate--two in, and two out.

Electronic Associates entered the general purpose digital computer field in a significant way last October when they introduced the EAI 8400, a scientific digital machine selling in the $200,000 - $300,000 area. True, a year previously they acquired 80% of the capital stock of Pacific Data Systems, Inc., a California-based manufacturer of desk-size digital computers. However the PDS units sell for under $22,000 each, and are essentially programmable electronic calculators for a limited range of engineering, scientific and system control problems, rather than real contenders in the mainstream of the computer market (to date under 50 of these units have been installed).

The reason for EAI's decision to enter in the digital computer field can be found in the evolving computer needs of the firm's main customers. EAI, nineteen years old this year, entered the analog computer field in 1954. Since that time the company has captured nearly 75% of the $30 million a year general purpose analog computer market. As the complexity of the simulation problems tackled by EAI's customers increased, upping required computation speeds, the company introduced hybrid computer systems which combine analog and digital computing techniques. EAI combined one of its analog computers with a DDP-24 digital computer from Computer Control to create the HYDAC series of hybrid computer systems, first marketed in 1962. The HYDACs enabled EAI to gain the major share of the hybrid computer market (the Beckman-SDS hybrid systems are the leading competitors). Although the hybrid computer field is still small, about $5 million in sales last year, it is currently developing at a 30% a year growth rate.

Recognizing the potential of the hybrid market, EAI began a product development program three years ago to produce a high-speed floating-point digital computer which could be combined with one of its own large-scale analog computers to offer a truly "built in-house" hybrid computer system. The result is the 8400. It is able to do floating-point addition in 2.76 usec., multiplication

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in 5.5 usec. These high-speed floating-point operations are needed in the digital part of a hybrid computing system used for complex simulation work, to allow the digital computer to ably interchange data with its analog computer partner that is manipulating wide-range, low precision variables at great speed.

The 8400 uses a 24-bit word with a 2 usec. memory available in sizes from 4K to 64K words. The instructions repertoire of the 8400 contains over 750 individual instructions, including all logical operations for 16, 8, 4, 2 and 1-bit byte manipulations. This huge instruction repertoire (over 5 times larger than that for System/360) offers a considerable flexibility in developing programs. It also adds considerable complexity and cost to program development and debugging time. Promised software for the 8400 includes a FORTRAN IV compiler, a macro-assembler, and a simulation monitor.

The 8400 has a modular structural organization. Each processor, memory and data channel element has a separate control facility. This allows multi-processor configurations that, when added to the system's ability to dynamically relocate program elements, makes the 8400 practical for time-sharing applications.

Although the 8400 appears to be a fine computer on a technical basis, its development may prove to be a costly misadventure for EAI for the following reasons:

1. Except for EAI's own digital plotting board, all peripheral equipment on the 8400 is from outside suppliers e.g. card equipment from Burroughs, line printer from Data Products, tape drives from Datamec. This means that 40% to 50% of the purchase price of an 8400 computer system must be passed on to other venders.

2. EAI does not have a market base in the digital computer field, and it is unlikely to muster the investment needed for the sales and service force, programming staff, and field sales offices required to compete effectively in the scientific computer market with such firms as Control Data, GE, and IBM. This leaves the use of the 8400 as the digital part of an EAI hybrid computer complex as the primary market for the product. Based on the present growth rate of the hybrid computer market, sales of the 8400 as part of a hybrid system are not likely to exceed 6-8 units in 1965, and 10-14 units in 1966.

3. The investment necessary to design, develop, and manufacture a sophisticated digital computer and particularly to develop and maintain the needed software support for versatile scientific computations, would seem to be much greater than the revenues expected from a sale of 25-35 systems in the 8400 price class.

At the present time there are about six orders for the 8400. One unit was sold as part of a $1.8 million hybrid computer order from NASA's Manned Spacecraft Center in Houston (the order also includes two EAI 8800 analog computers). NASA has also ordered two 8400's for its Ames Research Center in Mountain View, Calif. Another 8400 system is on order from a West Germany concern for use in aeronautical research.

In sum, EAI may well have underestimated the cost of entering the digital computer field. Although the 8400 will undoubtedly stimulate sales of its companion product, the EAI 8800 analog computer, as an element of a hybrid system, this benefit is unlikely to be enough for EAI to justify the costs of its digital computer development program.

Systems Engineering Laboratories, Inc. of Fort Lauderdale, Fla. became the newest competitor in the digital computer industry when they announced their SEL 810 and SEL 840 systems last month. Since its founding in 1961, SEL has been primarily engaged in the design and production of data acquisition and processing systems for the U.S. space exploration program. These systems are used principally for testing rocket engines and check-out of space vehicle designs. Last year SEL broadened its product line to include industrial process control systems. The desire to broaden the range of equipment it offered to these markets prompted SEL to develop small, general purpose digital computers which could be used with the company's data acquisition systems.

The first such computer developed, the SEL 820, was a rather limited 16-bit machine installed in a couple of data acquisition systems starting in the fall of last year.

The recent availability of silicon monolithic integrated circuits (SMIC) at commercial prices gave SEL the opportunity to significantly improve the design and performance of their computer. They did so and the new 810 and 840 computers are the first two members of a SMIC-based SEL 800 Series. The 810, the smaller of the computers, uses a 16-bit word in a 1.75 usec. memory with storage capacities from 4K to 32K words. It goes for about $30,000. The 840 uses a 24-bit word in a 1.75 usec. memory with the same capacities as the 810. Purchase price of the 840 is about $80,000. Typical processing speeds for the 810 are 3.5 usec. for addition, 17.5 usec. for fixed point multiplication. Software includes a one-pass FORTRAN IV compiler, an assembly language, and diagnostic and utility routines. Burroughs card equipment, Rheem paper tape equipment, Potter tape transports, and the Anelex line printers are available as peripheral equipment.

The 810 has captured eight orders since its introduction, with its first delivery expected in August. Three of the orders are for industrial applications in which SEL data acquisition systems and the 810 will be joined in a production control system. One is going to a major diesel engine plant and another to a truck manufacturing facility. The rest of the orders have been placed by NASA for space vehicle checkout systems. Two 840 systems have also been ordered by NASA for similar applications.

The new SEL units are systems computers and as such are competitive to similarly priced equipment offered by Computer Control, Digital Equipment, and Advanced Scientific Instruments. The limited software needed by the 800 Series should help SEL compete favorably in the systems computer market without major investments in programming and service support.

In the four years since its founding, SEL has grown from a handful of engineers to nearly 400 employees. It is listed as one of the 100 largest suppliers to NASA. Sales for fiscal 1964 ended last June were roughly $3 million. For the fiscal year ending this month, sales should top $5 million. The company is currently 90% owned by its employees; however a public stock offering can be expected in the fall of this year.

General Precision's withdrawal from the commercial computer field was first reported in our issue of February 1. It is worthwhile to review their departure at this time because of the current negotiations by which Control Data seeks to acquire the market base of small scientific and business computers now accounted for by some 670 installations of General Precision's LGP-30, LGP-21 and RPC-4000 computers. This acquisition would be a particularly timely one for Control Data,

for they are about to announce a small scientific computer using the logic circuitry of their 6000 Series. This small machine, likely to be called the 6100, is expected to be about twice as fast as the IBM 1800 system at one-half the cost ($1200-$1500/mo. typical rental). Although this is about 50% more costly than IBM's fast selling 1130 small scientific computer, its higher price/performance ratio, its companion upward expansible line of 6000 Series computers, and Control Data's good reputation in this market should make it a capable competitor of the 1130.

According to data developed by our market research staff, the user distribution of the market base being negotiated for by Control Data is as follows:

Nature of Using Organization	LPG-21 %	LPG-30 %	RPC-4000 %
Agriculture, Forestry, Fisheries, Mining and Contract Construction	16%	6%	2%
Chemical and Natural Products Processing including Paper and Publishing, Leather and Rubber Products	8	9	5
Durable Products Manufacturing including Stone, Glass, Metals, Machinery, and Instruments	57	22	58
Transportation, Communication and Public Utilities	3	4	0
Wholesale and Retail Trades	2	4	2
Finance, Insurance, Real Estate and General Business Services	0	7	4
Education, Medicine and Other Professional Services	2	18	2
Federal, State, City, and Local Government	12	30	27
	base = 143	base = 428 installations	base = 98

With the General Precision market base under their belt, Control Data will have customer relations with a sizable segment of the potential market for small scientific computers. Only IBM's market base of some 1700 IBM 1620 users exceeds this market coverage.

The final arrangements on the transfer of commercial computer assets from General Precision to Control Data are expected by the end of June.

Union Carbide Corp., after just over 13 months in the computer field, has had enough. As of June 30th, they are suspending the operations of and intending to dispose of the assets of Data Systems, Inc., the Detroit-based manufacturer of small systems computers which they bought up last Spring. According to a Union Carbide spokesman, the decision was made because the rate of growth of Data Systems in its market was not up to expectations.

The timing of the move is a surprise. During the past year Union Carbide is believed to have invested over $1 million to expand the marketing of Data Systems' existing product, the DSI 1000, a small systems computer selling for about $12,000. They let Data Systems just a week ago introduce a new computer, the DSI 2000, at the recent IFIP show in New York. The DSI 2000, said to be about 50% ready for production, uses integrated circuits and sells for about $20,000. According to a Data Systems official, interest at the IFIP show in the computer was very encouraging, with one customer interested in 25 systems. One reason given for this is that competitive systems such as the PDP-8, 3C DDP-116 and SDS-92 now have extended delivery dates due to large backlogs.

The original owners of Data Systems are seeking to continue the operations of the company under new investor support. Union Carbide's investment in the new DSI 2000 system is reported to include not only the design engineering and production development but also nearly $70,000 in systems language research. An estimated $1 million is still required, however, to ready the DSI 2000 for customer installation and software support.

ADDENDUM: Philco Corporation has recently reduced its marketing contacts in the commercial computer field almost to the vanishing point. They have closed all field sales offices except for the Philadelphia home plant. Marketing of their computer systems, including their six-months-old large-scale 2000-213 system, will be restricted almost exclusively to special government proposals.

NEW LARGE-SCALE IBM COMPUTERS SET OFF CHAIN OF PRICE REDUCTIONS AMONG COMPETITIVE SYSTEMS

In a special statement to the EDP I&M Report, IBM outlined the following price structure for their new 360/65 and 360/75 models (see April 27th issue) compared to the systems they superceded. The figures are for typical configurations. In each case the peripherals remain the same and the price changes represent the difference in the cost of the central processor and memory units:

SUPERSEDED SYSTEMS		NEW SYSTEMS	
Model	Rental per month	Model	Rental per month
Model 60 (128K 32-bit words	$51,100	Model 65 (128K 32-bit words)	$51,300.
Model 62 (128K 32-bit words)	$57,300		
Model 70 (256K 32-bit words)	$82,150	Model 75 (256K 32-bit words)	$79,550.

In terms of price/performance, this means that the Model 65 is about a 40% improvement over the Model 60, and a 35% improvement over the Model 62. The Model 75 is about a 25% improvement in price/performance over the Model 70. Value improvements like these significantly lower the so called "price umbrella" under which IBM's competitors generally operate.

(con't on page 8)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF MAY 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	22	2
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	1	5
	ASI 6040	Y	$2800	7/65	0	5
	ASI 6050	Y	$3000	10/65	0	1
	ASI 6070	Y	$3500	10/65	0	0
	ASI 6080	Y	$4000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	57	X
	RECOMP III	Y	$1495	6/61	15	X
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	14	1
	BR-300	Y	$3000	3/59	40	X
	BR-330	Y	$4000	12/60	35	X
	BR-340	Y	$7000	12/63	18	3
	BR-530	Y	$6000	8/61	15	X
Burroughs	205	N	$4600	1/54	57	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	168	X
	B100	Y	$2800	8/64	40	32
	B250	Y	$4200	11/61	98	8
	B260, 263	Y	$3750	11/62	160	110
	B270, 273	Y	$7000	7/62	135	25
	B280, 283	Y	$6500	7/62	73	25
	B370	Y	$8400	7/65	0	25
	B5000/B5500	Y	$20,000	3/63	37	12
Clary	DE-60/DE60M	Y	$525	2/60	314	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	58	15
	DDP-116	Y	$900	4/65	3	27
	DDP-224	Y	$3300	3/65	3	34
Control Data Corporation	G-15	N	$1000	7/55	328	X
	G-20	Y	$15,000	4/61	28	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	410	4
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	12	33
	3200	Y	$12,000	5/64	32	23
	3300	Y	$15,000	7/65	0	35
	3400	Y	$25,000	11/64	3	16
	3600	Y	$58,000	6/63	33	14
	3800	Y	$60,000	5/65	0	18
	6400	Y	$40,000	12/65	0	3
	6600	Y	$110,000	8/64	4	6
	6800	Y	$140,000	4/67	0	1
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	102	5
	PDP-6	Y	$10,000	10/64	8	10
	PDP-7	Y	$1300	11/64	10	50
	PDP-8	Y	$525	4/65	4	150
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Electronics Associates, Inc.	8400	Y	$7000	6/65	0	6
Friden	6010	Y	$600	6/63	210	180
General Electric	115	Y	$1375	12/65	0	70
	205	Y	$2900	6/64	19	16
	210	Y	$16,000	7/59	56	X
	215	Y	$6000	9/63	48	5
	225	Y	$8000	4/61	140	3
	235	Y	$10,900	4/64	40	10
	415	Y	$7300	5/64	45	90
	425	Y	$9600	6/64	25	50
	435	Y	$14,000	10/64	10	25
	625	Y	$41,000	12/64	3	17
	635	Y	$45,000	12/64	2	18
General Precision	LGP-21	Y	$725	12/62	143	X
	LGP-30	semi	$1300	9/56	428	X
	RPC-4000	Y	$1875	1/61	98	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	150
	H-200	Y	$4500	3/64	430	350

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd.)	H-400	Y	$8500	12/61	111	2
	H-800	Y	$22,000	12/60	78	10
	H-1200	Y	$6500	2/66	0	25
	H-1400	Y	$14,000	1/64	10	8
	H-1800	Y	$30,000	1/64	9	14
	H-2200	Y	$11,000	10/65	0	33
	H-4200	Y	$16,800	2/66	0	5
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3600	12/57	185	X
	360/20	Y	$1800	12/65	0	2200
	360/30	Y	$7500	4/65	20	2300
	360/40	Y	$16,000	4/65	15	600
	360/50	Y	$30,000	7/65	0	280
	360/60	Y	$48,000	8/65	0	20
	360/62	Y	$55,000	9/65	0	6
	360/65	Y	$49,000	1/66	0	60
	360/75	Y	$78,000	11/65	0	75
	650-card	N	$4000	11/54	260	X
	650-RAMAC	N	$9000	11/54	48	X
	1130	Y	$900	11/65	0	580
	1401	Y	$4500	9/60	8300	500
	1401-G	Y	$1900	5/64	830	100
	1410	Y	$12,000	11/61	800	90
	1440	Y	$3500	4/63	1550	550
	1460	Y	$9800	10/63	1150	130
	1620 I, II	Y	$2500	9/60	1700	30
	1800	Y	$3500	2/66	0	60
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	73	22
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	46	X
	7040	Y	$14,000	6/63	98	35
	7044	Y	$26,000	6/63	47	8
	705	N	$30,000	11/55	64	X
	7070, 2, 4	Y	$24,000	3/60	362	10
	7080	Y	$55,000	8/61	71	2
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	70	5
	7094	Y	$70,000	9/62	140	25
	7094 II	Y	$76,000	4/64	60	30
ITT	7300 ADX	Y	$18,000	9/61	9	5
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only-$5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	540	140
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	305	50
	NCR - 315-RMC	Y	$12,000	9/65	0	60
	NCR - 390	Y	$1850	5/61	880	80
	NCR - 500	Y	$1500	9/65	0	180
Philco	1000	Y	$7010	6/63	16	2
	2000-210, 211	Y	$40,000	10/58	21	2
	2000-212	Y	$52,000	1/63	8	3
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	580	25
	RCA 3301	Y	$11,500	7/64	25	30
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	4	1
	Spectra 70/15	Y	$2600	11/65	0	65
	Spectra 70/25	Y	$5000	11/65	0	50
	Spectra 70/45	Y	$9000	3/66	0	60
	Spectra 70/55	Y	$14,000	5/66	0	18
Raytheon	250	Y	$1200	12/60	170	10
	440	Y	$3500	3/64	11	6
Scientific Data Systems, Inc.	SDS-92	Y	$900	4/65	5	38
	SDS-910	Y	$2000	8/62	125	20
	SDS-920	Y	$2700	9/62	80	8
	SDS-925	Y	$2500	12/64	4	25
	SDS-930	Y	$4000	6/64	35	22
	SDS-9300	Y	$7000	11/64	10	6
UNIVAC	I & II	N	$25,000	3/51&11/57	30	X
	III	Y	$20,000	8/62	88	5
	File Computers	N	$15,000	8/56	22	X
	Solid-State 80 I,II, 90 I, II & Step	Y	$8000	8/58	330	X
	418	Y	$11,000	6/63	22	12
	490	Y	$26,000	12/61	44	16
	1004	Y	$1900	2/63	2500	300
	1050	Y	$8000	9/63	155	180
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	26	2
	1108	Y	$50,000	7/65	0	18
	LARC	Y	$135,000	5/60	2	X
				TOTALS	26,839	10,947

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

April 19 - May 28, 1965

	1965 High	1965 Low	6 weeks Sales in 100s	6 weeks High	6 weeks Low	Last	6 weeks Net Change	6 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	55 7/8	46 1/2	2110	53 3/8	47 1/4	47 5/8	-4 3/8	-8.41
American R & D	25 1/2	21 1/8	548	25	23	23 1/2	+1/2	+2.17
Burroughs	39	24 7/8	4513	38 7/8	34 3/4	38 3/8	+1/2	+1.32
Control Data	64 1/4	50 3/8	6204	59	50 3/8	58 7/8	+3 1/4	+5.84
Dura Corp.	33 1/8	25 1/4	439	32 1/2	25 1/4	25 3/8	-3 3/4	-12.87
Electronic Associates	27	16 3/4	5499	27	18 3/4	26 1/2	+5 1/2	+26.19
General Dynamics	45 1/2	35	7543	45 1/2	41 1/4	43	-1/8	-2.89
General Electric	106 3/4	91	3604	106 3/4	100 1/2	103 3/8	+3/8	+0.36
Honeywell	75 3/8	59 3/4	2091	71 1/2	65 1/2	65 1/2	-8 5/8	-11.63
IBM	491 1/2	404	1413	491 1/2	460	478	+6	+1.27
Inter. Tel. and Tel.	63 7/8	56 3/8	3029	60 3/4	57	60	+2 1/4	+3.89
Litton	96 1/4	74 5/8	3548	96 1/4	86 3/4	95 5/8	+7 1/2	+8.51
Nat. Cash Register	91 3/4	74	2065	91 3/4	79 1/2	90	+9 3/8	+11.62
RCA	37 1/2	31	19,409	37 1/2	33 1/4	35 1/2	+1/8	+0.35
Raytheon	25 3/8	21	4037	25 1/4	21	24	+1 1/2	+6.66
SCM	24 3/8	17 1/8	4519	24 3/8	21 5/8	23 1/8	+1 1/4	+5.71
Singer	83 1/4	69 3/4	3369	82 1/4	69 3/4	69 3/4	-11 3/8	-14.02
Sperry Rand	15 3/4	12	3057	14 1/4	12	12 1/8	-1 1/4	-9.34
NYSE COMPUTER STOCK AVERAGE							+0.48	+0.82
AMERICAN STOCK EXCHANGE								
ANelex	39	25 1/4	1271	35	26	26 3/8	-7	-20.97
Bunker-Ramo	11 1/4	7 7/8	3169	11 1/4	8 3/8	8 3/8	-1/4	-2.89
Cal Comp	24	14 3/4	443	19	14 3/4	16 5/8	+7/8	+5.55
Clary	6 1/8	4	592	5 3/8	4	4 1/8	-1 1/4	-23.25
Computer Sciences	48 3/4	19 5/8	1346	48 5/8	41 1/2	44 5/8	-4	-8.22
Milgo Elec.*	12 5/8	10 3/4	166	12 5/8	10 3/4	11 3/8	-3/8	-3.19
Planning Research	33 3/4	12 1/8	646	33 3/4	25 1/8	27	-1/4	-0.91
Potter Instrument	9	6 5/8	227	8 3/4	7 7/8	8 3/4	+3/8	+4.47
AMEX COMPUTER STOCK AVERAGE							-1.48	-6.17

* new stock entered 5/3/65 - only 5 week summary

	1965 High Bid	1965 Low Bid	May 28 Bid	May 28 Asked	6 weeks ago Bid
OVER-THE-COUNTER					
CEIR	13 1/2	7	12 3/8	12 5/8	10 1/2
Computer Usage	30 3/4	13 1/4	23	25 1/8	26 1/4
Computer Control	17 1/8	10 3/4	13	13 1/2	17
Digitronics	6 3/4	4 1/2	4 1/2	4 7/8	5 3/4
Scientific Data	44 3/4	31 3/4	40 3/4	41 3/4	44

(con't from page 5)

The reaction to this stiffened competition from IBM is already being felt. The Control Data 6600 and 6800 are expected to undergo a 10% - 15% price reduction shortly. General Electric has dropped the price of its 600 Series 10%-15%, depending on configuration. Univac is reported to have lowered the price of the 1108 some 20%. The encouraging side of the competitive picture in this market is that...

...THE ORDER RATE FOR LARGE-SCALE COMPUTERS PICKS UP STEAM

After a long, hard look, current users of large-scale computers are making their third generation computer selection in increasing numbers. Control Data has picked up three 6600 orders with one to Brookhaven National Laboratory, and one each to Bettis and Knowles Atomic Labs...thanks to cancelled 360/92 orders. GE has gotten two orders for 635's from Hughes Aircraft...the equipment will replace five computers, including an interconnected IBM 7094 II and 7040 system. Another 635 order is expected shortly from Ohio State University. IBM receives orders for its Model 67 from Lincoln Labs, Univ. of Michigan, Cal Tech, and the MIT Computation Center, among others. Univac now counts Boeing among its 1108 on-order customers.

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SAMPLE ISSUE
We Invite Your Subscription
See Order Card Inside

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UNIVAC, LONG AN INDUSTRY QUESTION MARK, MAY BE ACHIEVING PROFITABLE BASIS FOR FIRST TIME THROUGH SELECTIVE EXPANSION OF CURRENT PRODUCT LINES

An estimated $220 million loss on $1.8 billion of total revenues! That is surely a business performance that makes one wish for the brickbat concession at any meeting of the firm's stockholders. And to the holders of some 30 million shares of the Sperry Rand Corp., this performance is painfully familiar. It represents, approximately, the accumulative performance of the Univac Division of Sperry Rand in the ten years since Remington Rand, Inc. merged itself and its computer product line with the Sperry Corp. to form Sperry Rand.

The effect of Univac's performance upon the overall profit picture of Sperry Rand has understandably been severe. During the fiscal year ending last March 31, for example, Sperry Rand's pretax profit from its operations outside of its Univac and Office Equipment Division was nearly $76 million . . . but Univac, with a little help from the Office Equipment Division, managed to post a pretax loss of $24 million reducing overall SR pretax profit to $52 million . . . a drop of 31% Only $5.3 million of this loss was produced from regular Univac operations; $14 million was from additional depreciation on computers on rental due to an accelerated depreciation schedule adopted during the year (from a five year straight line method to a five year sum-of-the-digits schedule), and $4.7 million resulted from a write-off of special fixtures and test equipment for computers out of production, leaseholds and excess costs on a contract.

Such an unprofitable performance has caused Univac to face challenges from many sides. Some Sperry Rand stockholders have merely questioned the desirability of Univac's continuing in the computer business. Others have demanded that the division be sold. Customers have felt uncertain about the likelihood of Univac's continuing commitment to supporting their equipment. Competitors have played up rumors that Sperry Rand does not have the will to let Univac stay in the computer business, thereby hurting the division in the marketplace. In this report we shall try to make an overall evaluation of the prospects for Univac in the computer and data processing business by examining (1) its current income performance, (2) organizational changes it is making to improve its profitability, (3) the status of its current product line, (4) the potential of new product introductions, (5) its relationship to its major markets, and (6) the key developments that will signal its future.

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Recent income statements do, in fact, provide one basis for considerable optimism about the future of Univac. The division has been making considerable progress in improving the profitability of its operations during the last three years, first under Dr. Louis Rader and for the last year under J. Frank Forster, Univac head and now newly elected president of Sperry Rand. The three-year results have been:

Fiscal Year Ended	Total Revenues	Net Income
March 31, 1965	$293,000,000	- $5,600,000 (Loss)
March 31, 1964	$245,000,000	-$16,000,000 (Loss)
March 31, 1963	$198,000,000	-$26,000,000 (Loss)

Univac's first quarter losses during the current fiscal year were $800,000 versus $1,200,000 for the quarter a year earlier, so the loss reduction trend is continuing.

Univac's current strategy for getting into the black, dubbed "Forster's Formula", is based upon a three-part effort: (1) Reducing overhead by consolidating operations and eliminating redundant management planning and support functions; (2) Establishing separate operating activities as "profit centers" and installing strict accounting and budgeting procedures; and (3) Introducing new products designed to encourage current customers to continue to use most of their currently leased Univac equipment for extended periods.

Organizational Changes

The effect of the first measure can be seen in the current transfer of most of the Univac management and technical personnel at Univac's headquarters in New York City to its R&D and manufacturing facility at Blue Bell, Penna. Between 250 and 300 professional and management people are involved in this transfer.

The second measure stimulated a reorganization of Univac last fall into five separate divisions, each with its own profit accountability. These are the Data Processing Division, handling all domestic commercial computers and punched card systems; the Defense Computer Systems Division, marketing special-purpose computer systems to the military; the International Division, marketing Univac equipment overseas; the Data Processing Centers Division operating computer service bureaus; and the Card and Tape Division manufacturing and selling peripheral equipment.

The conviction behind the third measure was spelled out very clearly by Forster at SR's Annual Meeting last year when he was quoted as saying "the key to profit progress in the computer industry depends on how long your equipment stays on rental." To evaluate the degree of success Univac is likely to have in achieving sustained rentals, let's take a close-up look at Univac's current computer product line, its recent and expected new product announcements, and the attitude of current Univac customers toward continued use of their equipment.

Current Product Line

No company in the computer field can compete with Univac in terms of the variety of unrelated computer products introduced on the market. The early Univac's, the Univac III, File Computers, Solid-States, 1100 Series, 1107 Series, 1050's, 1004's, 490's, Larcs, etc., have all been separate computers or computer families introduced by the company. Each of these machines has been

generally regarded as a good product technically, but the timing with which they have been introduced and the marketing coordination with which they have been sold has led one observer to describe Univac as "the company which can snatch defeat from the jaws of success."

What led to the development of a Univac product line which in some cases competed with itself for the same market sector while neglecting other important market areas? A key factor was a continuing rivalry between the two principal engineering groups within Univac, the Philadelphia-based group which developed from the acquisition of the Eckert-Mauchly Computer Corp., and the St. Paul group which developed from the acquisition of Engineering Research Associates. In the latter part of the '50's and the early '60's, both groups strove to outdo one another by introducing the most technically advanced computer they could design within a three year cycle . . . although Univac was at the time depreciating its equipment over eight years . . . a process which led to the huge write-offs which Univac was required to take in two of the last three fiscal years. This rivalry has been apparently diverted in the last three years from an inner- to an outer-directed aggression. The Philadelphia group is concentrating on small- and medium-scale EDP systems while the St. Paul group handles the real-time systems (such as the 418 and 490), the 1107 Series, and the special military computers.

Univac's major computer lines currently installed are the 1004's, Solid-States, 1050's, III's, 490's, and 1107's. The attitude of current customers who have these computers on lease provides an important indicator of the continuing market life of this equipment. To assess this attitude, we conducted during the past week a telephone survey of a sample of current users of these Univac computers. Ten users of each type of system were questioned. We asked each user the following questions:

1. How do you rate the performance of Univac computer hardware in light of your expectations for it?

2. How do you rate Univac software and programming support for your system?

3. How do you rate Univac maintenance service for your system?

4. How do you rate Univac training program for your personnel?

5. How long do you estimate you will continue to use your current Univac equipment?

6. Is it likely that your next computer will also be from Univac?

The results of this survey and our analysis of the current Univac product line are as follows:

UNIVAC 1004

Current Status: This is a compact, plugboard-programmed computer. It is principally used by customers upgrading from tab installations and as a satellite processor for larger computers. Its two basic models, the I and II, can process cards at the rate of 340 and 600 cards per minute respectively. A special processor model, the III, can control one or two magnetic tape units. Core storage is 961 characters, with an additional 961 storage positions available

in an optional attachment. Rental range is from $1150 to $2750 per month. There are approximately 2900 installations at the current time of which about 83% are on lease. It is Univac's greatest current revenue producer.

Customer Survey

Hardware Performance: Rated generally excellent.
Software Support : Training of customer personnel to prepare plugboards only direct support required.
Maintenance Service : Rated as excellent.
Customer Training : Generally adequate. Three users cited shortage of Univac personnel for on-site instruction. A one week training course offered with this machine was rated just passable.
Continued Use : Nearly all users envisioned two or more years of further use of their 1004.
Manufacturer of Next Computer: Users were too far away from this decision to have any decided opinions here.

Extensions of Product Line: A special high-speed card collator, the 1001, was announced this spring (see EDP I&MR of April 27) which significantly increases the overall performance of a 1004 for about a 25% increase in rental. First deliveries will be made in January, '66. A small disc memory with replacable discs (similar to GE's DS-10 unit) should be available this fall for the 1004. Also, a possible new computer introduction, called either the 1040 or the 1005, which combines a stripped-down 1050 processor with a 1004 may be formally introduced in this country shortly. It is now being marketed in Europe under the 1040 label. Its functional equivalent in this country has been sold as a 1050-4 1004 system.

SOLID STATE 80/90 I, II

Current Status: The Solid State I was originally introduced in 1958 as a card processing computer. Subsequently tapes and drums were added to the system. The Solid-State II added core storage and additional instructions to the SSI. Rental range is from $4300 to $12000 a month. There are approximately 230 installations at the current time with about 45% of them on lease.

Customer Survey

Hardware Performance: Generally good.
Software Support : The Solid-State I's were generally found difficult to program. The II was considerably better in this respect. Back-up services were generally described as being less than or just bearly adequate.
Maintenance : Excellent.
Training : Less than adequate during the last two years.
Continued Use : Nearly all users surveyed planned to remove their machine within two months to two years of current date. Customers using SS 90's usually reported that their 90 column card operations did not make them adaptable to other EDP equipment being installed in their company and they were changing to 80 column card equipment.
Manufacturer of Next Computer: In nearly 50% of the cases the user was definitely switching to a computer of another manufacturer.

Extensions of the Product Line: This older computer line is currently

being phased out of the Univac product line. No direct extensions are being planned. Users are encouraged to switch to a 1050. All Solid-States have been depreciated to zero on Univac's books.

UNIVAC 1050

Current Status: This is a small- to medium-scale system designed for business applications. It was first conceived about five years ago as a competitor for the 1401. It was first introduced in May, 1962, but for marketing reasons it was only sold as an off-line I/O processor for larger Univac computers. An upgraded version, the 1050-II was developed early in 1963 to include communications and drum storage equipment. One hundred fifty-two of these systems were ordered by the Air Force during that year. In March, 1964, a 1050-III and 1050-IV versions were introduced as general-purpose EDP systems with a broad line of peripheral equipment and software. The III and IV models differ in processor speed, the IV being about three and a half times faster than the III. Rental range for the 1050 is usually between $5000 and $12,000 per month. There are currently about 170 installations of which approximately 90% are on lease.

Customer Survey

Hardware Performance	:	Excellent.
Software Support	:	Slow delivery experienced; in some cases performance has been initially disappointing.
Maintenance	:	Very good.
Training	:	Satisfactory.
Continued Use	:	Most commercial users tend to view the 1050 as an interim system; they expect to use the system only two to three years.

Manufacturer of Next Computer: Too indefinite to predict at this time.

Extensions of the Product Line: The operation speed of current 1050 processors reveal their early origin. A new processor offering a memory cycle time of about 1 usec. is likely (versus 4.5 usec. currently). New random access storage devices and a variety of inquiry terminals can be expected to be added to the line also. The introduction of an integrated 1050-1004 machine should help expand the customer base for this machine.

UNIVAC 490 Series

Current Status: This is a medium- to large-scale system designed primarily for real-time operations where information is maintained in continuously updated records. Examples are airline reservation systems, saving bank operations, production scheduling, inventory control, message switching, etc. The first customer delivery was made at the close of 1961. Rental range is from $20,000 to $50,000 a month. Currently there are about 53 installations of which about 45% are on lease.

Customer Survey

Hardware Performance	:	Good.
Software Support	:	For specialized applications, specific programs are carefully developed for continuous use. General business software support was rated as good while scientific software support was rated as poor.
Maintenance	:	Excellent.
Training	:	Good.
Continued Use	:	Three or more years in specialized applications.

Manufacturer of Next Computer: Too uncertain to predict.

Extensions of the Product Line: The 490 line has recently been expanded by the addition of three new processors, the 491, 492, and 494. The 491 and 492 are about 20% faster in processor speed than the 490 and from 10% to 30% cheaper. The 494 is six to ten times faster than the 490 at about half again the cost. These new processors offer improved technical features for real-time applications and should considerably improve the market acceptance of this product line. The new processors supercede the 490 itself in the product line. Further announcements can be expected to provide increased random access storage capability, add a variety of inquiry stations to the line, and offer added features for time sharing. (A smaller computer which is a market relative of the 490 is the Univac 418. This is a medium-scale system oriented toward real-time and message switching applications. The 418 is the commercial brother of the 1218, a militarized computer. Both computers evolved from the Univac CUT (Control Unit Tester), a special-purpose computer designed to test peripheral equipment for larger Univac computers. A modified version of the 418 processor serves as the CP for the Westinghouse PRODAC 510 and 580 process control systems. The first installation was made in June '63. Rental range is from $7000 to $18,000 per month. There are currently about 24 installations and about 45% of these are on lease. The 419, an upgraded 418 operating at twice the speed of its predecessor, has been designed.)

UNIVAC III

Current Status: This medium- to large-scale EDP system is designed for handling the processing of large data files. It can operate on several programs simultaneously. It was first installed in 1962. Rental range is from $20,000 to $35,000 a month. There are currently about 88 installations of which about 75% are leased.

Customer Survey:

Hardware Performance	Satisfactory.
Software Support	Delivery of software was frequently late although current software support is rated as adequate.
Maintenance	Excellent.
Training	Good.
Continued Use	From two to four years.
Manufacturer of Next Computer	No current plans to switch to another manufacturer in most cases.

Expansions of the Product Line: Univac has offered very little recently to directly expand the facilities or processing performance of III installations. This system was designed and developed by the Philadelphia-based group at Univac which has lately been concentrating on smaller systems. It may be that the company has decided to service the users of this size EDP system with one of the first announced processors of its new line of program-compatible computers (more details ahead). A simulator or "emulator" for the III on the new machine will no doubt be provided.

UNIVAC 1107

Current Status: This is a large-scale computer suitable for both commercial and scientific applications. Its outstanding technical feature is the use of a thin film control memory. It is the successor to the 1103 and 1105 vacuum-tube computers, although not program compatible with them. First installation was in 1962. Monthly rental range is from $40,000 to $70,000 a month. The computer competes in the CDC 3600 and IBM 7090 series market. There are currently about 25 installations of which about 60% are leased.

Customer Survey:

Hardware Performance	:	Good.
Software Support	:	The FORTRAN compiler supplied with this computer described as "one of the best checked-out language processors to ever hit the street." In contrast, the COBOL compiler was generally considered inadequate.
Maintenance	:	The design complexity of this machine, like its competition, can cause maintenance headaches, and sometimes excessive delays in getting the computer "back on the air."
Training	:	Not really pertinent to the usual "open shop" operations under which this computer is used.
Continued Use	:	Most 1107's being updated to 1108's in '66. At least two to four more years of continued use is foreseen.

Manufacturer of Next Computer: About even chance that the user's next large computer will be from Univac.

Expansion of the Product Line: The 1108 was introduced to offer considerably increased processing performance (5.8X) over the 1107, and to meet the increased competition in the large-scale computer field. Univac is claimed to have invested over $5.5 million to date for general and special programs for the 1107... and investment it will want to protect. A 1109, an integrated circuit machine that is program-compatible with the 1107/1108, is expected to be announced this fall. It should increase the processing performance of the 1108 by from four to six times and offer special features for time-sharing operations.

Univac's Major Market

About 44% of Univac's revenue comes from a single customer, the Federal Government. About 30% of the value of Univac's currently installed commercial computers are used by the government. In addition, special militarized computers and systems sold through Univac's Defense Systems Division account for an estimated 18% of Univac's annual revenue.

Univac's success in selling to the government has been due to imaginative and aggressive marketing (in a way unrivaled to date by the commercial sales organization), and a willingness to offer substantial price discounts on volume orders. An example of the latter is illustrated by Univac's response to a recent Navy bid-request for 57 computers including two proto-type models of a ship-based EDP system. Bunker-Ramo offered BR-130's in a bid at $18.4 million. Honeywell offered a militarized version of the H200 in a bid at $16.9 million. But Univac won the contract with an offering of a modified 1050 system at a stark $9.8 million bid.

Univac's Defense Systems Division has enjoyed good success in providing militarized and airborne computers for the check-out, guidance and tracking of missile systems. Over 100 computers have been produced for the Naval Tactical Data System and over 50 1218 computers have been produced for a variety of military real-time applications. NASA recently placed a $13.4 million order for 40 Univac 1230 computers (a new system closely related with the Naval Tactical Data System computers) for processing telemetry data at tracking stations around the world. As the nation's space and missile program continues to expand, it should offer a growing and profitable market for Univac's defense computer activities.

International Operations

Univac's international sales operations are also an optimistic factor in the prospects for the division. Over 600 systems are installed in Europe, of which about 400 are 1004's. In fact, Univac's share of the European market (about 9%) is greater than in the U. S. (about 7.5%). Japan has provided a growing market for the 1004 and now the 1050. Profitability of the overseas operations has been encouraging with revenues increasing at nearly 35%-40% a year at the current time. Several product offerings have been selectively offered overseas, such as the 1040, a modified version of the 1050. Probably some 15%-17% of Univac's revenues this year will come from overseas operations.

Univac at Crossroads

In spite of the several bright spots in Univac's current situation, it is clear that the division must make a clearly defined decision within the next eighteen months about which path it will take in the computer business. Either the division must be sold, in whole or in pieces, or else the company must compete with third-generation computer families by announcing a new program-compatible computer series of its own.

The speculators who think the division might be sold envision the lower end of the Univac line...the punched card equipment, the 1004 and the 1050...being split off as an acquisition attractive to a company like General Electric, Litton Industries or Ford Motor. The high end of the line, the 490's, 1107's etc. might prove an attractive acquisition to Control Data or General Electric. However such speculation was clearly put down by Sperry Rand's Chairman H. F. Vickers who said in the latest Annual Report of the company: "Data processing is a dynamic industry, having great growth potential. It has established a place in the world's economy that is essential and will continue to grow. Such dependence upon any industry in the past has led not only to growth but also profitability. Therefore, we have determined that we will remain in and grow with the data processing business. To that end we are continuing to stress the maintenance of technological leadership and are developing new products to be announced in planned progressive steps to fill the requirements of present and future customers with a compatible Univac family of computers." (emphasis added)

The characteristics of such a compatible family of Univac computers are not yet certain. However it can be judged that the family will use integrated circuits in its construction and will feature extensive logic for real-time and time-sharing applications. Also, the line will most likely be IBM 360 program compatible, giving Univac the option of blending its equipment in with IBM's at major customers who are planning an organized complex of computer systems in diverse locations. The actual introduction of the series may start in six to nine months... the initial announcement date is based almost entirely on market and profit considerations, for the equipment has been fully designed in an engineering sense. The introduction can be expected in steps, with the schedule for the introduction of processors being matched to the market area where product support in terms of continuous customer service is needed. As one insider at Univac commented, "We don't want to 'emulate' the slow market acceptance of RCA's Spectra 70 series by revealing nearly our entire hand too early." First models to be announced will probably be in the upper medium-scale area, with systems renting between $20,000 and $30,000 a month.

Key Factors in Strengthening Univac's Position

Among the key factors that will determine the degree of success Univac has in achieving a profitable position are:

(1) Depreciation: Univac will have to avoid getting caught in the future with a sizable number of used computers on hand that do not have a continuing market life and that are not yet fully depreciated on their books. The new accelerated depreciation schedule should eliminate the possibility of this happening. Also, the introduction of equipment extending the market life of existing installations and the offering of price incentives to encourage customers currently leasing older computers to purchase their equipment may well bring in considerably more income on fully depreciated systems.

(2) Personnel: Univac has been labeled "the training ground of the industry" because so many of its competitors (outside of IBM) are populated with Univac graduates. This problem of personnel stability should be at least partially solved by the management changes introduced by Forster to correct what a former Univac head had termed the division's "organizational anarchy". Also, the fact that forster is now head of Sperry Rand should ease a traditional complaint at Univac that the "top brass" did not understand the requirements of the computer business. The ability of Univac to attract and hold good people in staff management and marketing positions will be crucial to its continuing progress.

(3) Punched Card Field: Univac has an asset in its base of punched card equipment users which is unrivaled by any of its competitors, save IBM. The continued cultivation of this important market area (it has been somewhat neglected of late by Univac as the division concentrated on its problems in the computer field) can provide a very profitable market base from which to upgrade customers to 1004's and other more sophisticated card processing equipment. Univac's electronic card punches and verifiers have the potential of making a little noticed yet quite profitable contribution to the division's revenue.

(4) Government-Supported R&D: Univac's continued success in real-time systems and in large-scale computers will depend to a considerable extent on the quality of its technological skills in developing advanced circuitry and peripheral equipment. The cost of these developments is directly related to the degree in which they are underwritten by the Federal Government as R&D projects in the development of advanced military and space computers. This facit of Univac's operations will have to experience continued success to provide the technical advances to support Univac's market position in the important commercial areas just mentioned.

Conclusion

All in all, current developments at Univac appear to provide the platform from which sharp improvements in the profitability of Univac's operations can be achieved this year. Although Univac's revenues in the current fiscal year are not likely to increase by more than 15% compared to an 18% increase last year,

(con't on last page)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF JUNE 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	22	2
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	1	4
	ASI 6040	Y	$2800	7/65	0	4
	ASI 6050	Y	$3000	10/65	0	1
	ASI 6070	Y	$3500	10/65	0	0
	ASI 6080	Y	$4000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	57	X
	RECOMP III	Y	$1495	6/61	15	X
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	14	1
	BR-300	Y	$3000	3/59	40	X
	BR-330	Y	$4000	12/60	35	X
	BR-340	Y	$7000	12/63	18	3
	BR-530	Y	$6000	8/61	15	X
Burroughs	205	N	$4600	1/54	57	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	167	X
	B100	Y	$2800	8/64	44	30
	B250	Y	$4200	11/61	100	7
	B260	Y	$3750	11/62	170	100
	B270	Y	$7000	7/62	138	26
	B280	Y	$6500	7/62	75	24
	B370	Y	$8400	7/65	0	30
	B5000/B5500	Y	$20,000	3/63	37	12
Clary	DE-60/DE-60M	Y	$525	2/60	324	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	58	15
	DDP-116	Y	$900	4/65	4	25
	DDP-224	Y	$3300	3/65	4	35
Control Data Corporation	G-15	N	$1000	7/55	328	X
	G-20	Y	$15,500	4/61	28	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	410	4
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	15	35
	3200	Y	$12,000	5/64	60	23
	3300	Y	$15,000	7/65	0	37
	3400	Y	$25,000	11/64	8	16
	3600	Y	$58,000	6/63	35	14
	3800	Y	$60,000	5/65	0	18
	6400	Y	$40,000	12/65	0	2
	6600	Y	$110,000	8/64	4	8
	6800	Y	$140,000	4/67	0	8
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	110	5
	PDP-6	Y	$10,000	10/64	8	10
	PDP-7	Y	$1300	11/64	11	50
	PDP-8	Y	$525	4/65	9	160
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	0	5
Friden	6010	Y	$600	6/63	211	201
General Electric	115	Y	$1375	12/65	0	85
	205	Y	$2900	6/64	22	18
	210	Y	$16,000	7/59	56	X
	215	Y	$6000	9/63	49	6
	225	Y	$8000	4/61	140	4
	235	Y	$10,900	4/64	44	9
	415	Y	$7300	5/64	54	90
	425	Y	$9600	6/64	30	52
	435	Y	$14,000	10/64	10	25
	625	Y	$41,000	12/64	5	18
	635	Y	$45,000	12/64	3	20
General Precision	LGP-21	Y	$725	12/62	143	X
	LGP-30	semi	$1300	9/56	425	X
	RPC-4000	Y	$1875	1/61	98	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	150
	H-200	Y	$4500	3/64	475	360

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd.)	H-400	Y	$3500	12/61	120	10
	H-800	Y	$22,000	12/60	80	11
	H-1200	Y	$8000	2/66	0	30
	H-1400	Y	$14,000	1/64	11	3
	H-1800	Y	$30,000	1/64	9	11
	H-2200	Y	$11,000	10/65	0	40
	H-4200	Y	$16,800	2/66	0	5
	DATAmatic 1000	N	$40,000	12/57	3	X
IBM	305	N	$3500	12/57	135	X
	360/20	Y	$1800	12/65	0	2500
	360/30	Y	$7500	4/65	40	2250
	360/40	Y	$16,000	4/65	45	650
	360/50	Y	$30,000	7/65	0	280
	360/60	Y	$48,000	8/65	0	20
	360/62	Y	$55,000	9/65	0	6
	360/65	Y	$49,000	1/66	0	75
	360/75	Y	$78,000	11/65	0	85
	650-card	N	$4000	11/54	255	X
	650-RAMAC	N	$9000	11/54	46	X
	1130	Y	$900	11/65	0	700
	1401	Y	$4500	9/60	8300	450
	1401-G	Y	$1900	5/64	855	100
	1410	Y	$12,000	11/61	800	80
	1440	Y	$3500	4/63	1600	500
	1460	Y	$9300	10/63	1200	130
	1620 I, II	Y	$2500	9/60	1700	30
	1800	Y	$3500	2/66	0	65
	701	N	$5000	4/53	1	X
	7010	Y	$19,175	10/63	75	20
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	6	X
	704	N	$32,000	12/55	45	X
	7040	Y	$14,000	6/63	100	30
	7044	Y	$26,000	6/63	50	12
	705	N	$30,000	11/55	64	X
	7070, 2, 4	Y	$24,000	3/60	360	8
	7080	Y	$55,000	8/61	71	1
	709	N	$40,000	8/58	11	X
	7090	Y	$64,000	11/59	68	4
	7094	Y	$70,000	9/62	135	15
	7094 II	Y	$76,000	4/64	65	30
ITT	7300 ADX	Y	$18,000	9/61	9	5
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only- $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	550	140
National Cash Register Co.	NCR - 304	Y	$14,000	1/60	26	X
	NCR - 310	Y	$2000	5/61	46	1
	NCR - 315	Y	$8500	5/62	310	50
	NCR - 315-RMC	Y	$12,000	9/65	0	60
	NCR - 390	Y	$1850	5/61	910	80
	NCR - 500	Y	$1500	9/65	0	170
Philco	1000	Y	$7010	6/63	16	2
	2000-210,211	Y	$40,000	10,58	21	2
	2000-212	Y	$52,000	1/63	9	3
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	590	18
	RCA 3301	Y	$11,500	7/64	27	28
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	4	1
	Spectra 70/15	Y	$2600	11/65	0	65
	Spectra 70/25	Y	$5000	11/65	0	55
	Spectra 70/45	Y	$12,000	3/66	0	65
	Spectra 70/55	Y	$25,000	5/66	0	20
Raytheon	250	Y	$1200	12/60	170	10
	440	Y	$3500	3/64	11	6
	520	Y	$3200	10/64	0	4
Scientific Data Systems Inc.	SDS-92	Y	$900	4/65	6	38
	SDS-910	Y	$2000	8/62	127	20
	SDS-920	Y	$2700	9/62	82	8
	SDS-925	Y	$2500	12/64	8	25
	SDS-930	Y	$4000	6/64	36	23
	SDS-9300	Y	$7000	11/64	10	7
Systems Engineering Labs	SEL-810	Y	$750	8/65	0	8
	SEL-840	Y	$1000	10/65	0	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	88	5
	File Computers	N	$15,000	8/56	22	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	320	X
	418	Y	$11,000	6/63	34	50
	490	Y	$26,000	12/61	45	17
	1004	Y	$1900	2/63	2750	300
	1050	Y	$8000	9/63	165	180
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	27	2
	1108	Y	$50,000	7/65	0	19
	LARC	Y	$135,000	5/60	2	X
				TOTALS	27,488	11,351

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

June 1 - July 23, 1965

	1965 High	1965 Low	8 weeks Sales in 100's	8 weeks High	8 weeks Low	Last	8 weeks Net Change	8 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	55 7/8	41 1/8	2,425	48 1/4	41 1/8	44 3/8	-3 1/4	-6.82
American R & D	25 1/2	17 5/8	494	23 3/4	17 5/8	18 3/4	-4 3/4	-20.21
Burroughs	39	24 7/8	6,579	38 3/8	28 3/4	32 1/8	-6 1/4	-16.29
Control Data	64 1/2	32 1/4	21,333	60 1/8	32 1/4	34 1/8	-24 3/8	-42.03
Dura Corp.	33 1/8	21 1/8	322	26 3/8	21 1/8	21 1/8	-4 1/4	-16.75
Electronic Associates	27	16 3/4	2,699	28 1/2	19 3/8	20 3/4	-5 3/4	-21.70
General Dynamics	45 1/2	35	7,425	43 5/8	35 3/4	41 3/8	-1 5/8	-3.78
General Electric	106 3/4	91	6,760	103 7/8	91 1/2	97 3/4	-5 5/8	-5.44
Honeywell	75 3/8	58 1/4	3,240	66	58 1/4	61 7/8	-3 5/8	-5.53
IBM	491 1/2	404	3,539	477 1/2	437 1/2	466	-12	-2.50
Inter. Tel. and Tel.	63 7/8	50 7/8	4,751	59 1/8	50 7/8	51 1/4	-8 3/4	-14.58
Litton	96 3/8	74 5/8	6,108	96 3/8	78 1/8	87 5/8	-8	-8.37
Nat. Cash Register	91 3/4	74	3,237	89 7/8	75 1/8	75 3/8	-14 5/8	-16.25
RCA	37 1/2	31	18,061	35 3/4	31 7/8	33 7/8	-1 5/8	-4.58
Raytheon	25 3/8	19	1,986	24	19	22 1/2	-1 1/2	-6.25
SCM	24 3/8	16 1/4	4,266	23 3/8	16 1/4	18 1/4	-4 7/8	-21.08
Singer	83 1/4	60 3/4	3,885	70	60 3/4	61	-8 3/4	-12.54
Sperry Rand	15 3/4	11 1/8	12,381	13 1/4	11 1/8	11 5/8	- 1/2	-4.12
NYSE COMPUTER STOCK AVERAGE							-6.67	-12.71
AMERICAN STOCK EXCHANGE								
ANelex	39	20 1/4	931	26 1/4	20 1/4	22 1/2	-3 7/8	-14.69
Bunker-Ramo	11 1/4	5 7/8	1,588	8 1/2	5 7/8	6	-2 3/8	-28.36
Cal Comp	24	13	405	18 3/8	13 5/8	13 7/8	-2 3/4	-16.54
Clary	6 1/8	3 3/8	408	4 1/8	3 3/8	3 3/4	- 3/8	-9.09
Computer Application	32 1/4	15 3/4	1,228	26 1/2	15 3/4	19 3/8	-6 3/4	-25.83
Computer Sciences	59 1/2	19 5/8	5,234	59 1/2	43 1/8	51 1/8	+6 1/2	+14.56
Milgo Elec.	12 5/8	8 5/8	163	11 1/8	8 5/8	9 1/8	-2 1/4	-19.78
Planning Research	33 3/4	12 1/8	438	27	19 3/8	22 1/4	-4 3/4	-17.59
Potter Instrument	9	6 5/8	230	9	6 5/8	7 3/8	-1 3/8	-15.71
AMEX STOCK AVERAGE							-2.00	-14.78

	1965 High Bid	1965 Low Bid	July 23 Bid	July 23 Asked	8 weeks ago Bid
OVER-THE-COUNTER					
CEIR	13 1/2	7	10 3/4	11	12 3/8
Computer Usage	30 3/4	13 1/4	18	21	23
Computer Control	17 1/8	10 1/2	10 5/8	10 7/8	13
Digitronics	6 3/4	3 7/8	5 3/8	5 3/4	4 1/2
Scientific Data	44 3/4	31 3/4	34	34 3/4	40 3/4

(con't from page 9)

we look for the division to achieve profitable operations on a month-by-month basis by the fourth quarter of this fiscal year.

Performance in the future fiscal years will be largely determined by the timing of the introduction of the division's proposed new product line as well as the date and rate of delivery of their equipment. With a reasonable market acceptance for this new line, the Univac division gives every indication of being able to reach revenues of $450 million for the fiscal year ending in March '68 with operating profits of better than $20 million. The ever-present technical and competitive uncertainties of the computer business make any such projection, of course, highly speculative. The wherewithall is clearly present, however, and the current 20%-25% a year growth rate in the computer field provides a momentum that should carry the division to the threshold of many new market opportunities in the field. Univac's progress will be reported and analyzed periodically by the editors of the EDP I&M Report.

September 24, 1965 Vol 1., No. 20

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E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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PL/I - THE NEW PROGRAMMING LANGUAGE AND ITS POTENTIAL INFLUENCE ON THE COMPUTER INDUSTRY

To date, IBM has invested an estimated 100 man-years and several million dollars to further the development of a new computer programming language, PL/I. Progress on PL/I has been such that some programming experts predict that the new language will offer an omni-purpose, compatible, modular vehicle for computer programming even greater in importance than the hardware advances represented by new computer series such as System/360, Spectra 70, Honeywell 200, etc.

The market implications of PL/I are considerable, not only for IBM's immediate customers, but also for IBM's competitors. A great deal of expensive attention is being focused on PL/I in many quarters...including some leading users of non-IBM computers. A close look at the current status and prospects of PL/I is well justified at this time.

WHAT IS PL/I?

In computer parlance, a language is a system consisting of a carefully defined set of characters with rules for combining them into larger units (words or expressions) which have specifically assigned meanings. Such a language is used for representing and communicating information or data between or among people and machines. A language is said to be implemented on a computer when a special program (called a compiler) is prepared which will translate statements expressed in the language to instructions expressed in the basic machine code of the computer.

When PL/I was first conceived, a committee in SHARE (users of large IBM computers) was formed consisting of three IBM representatives and three user representatives. Preliminary studies on PL/I were done by this committee. When the specifications of the language were developed to the point where implementation was the logical next step, responsibility was turned back to IBM.

Although the language rules for PL/I have recently been presented to the industry by IBM through a manual of specifications, implementation of this language on System/360 is still in the future. In fact, IBM estimates it is at least another eight months away.

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The questions that need to be asked of PL/I are: What is its purpose? Does it fulfill that purpose? Is it better than existing languages? Does its unique features justify the cost of writing compilers, suffering through initial stages of development, and retraining personnel? Will it be efficient in terms of compile time and program execution time? At this period in the development of the industry when programming a problem is often more expensive than processing it, and the "right" software is often the deciding cost factor in the efficient solution of a problem, one must ask, "Is this trip really necessary?"

PL/I's "Raison d'Etre" -- It is claimed by the originators of PL/I that none of the languages of the FORTRAN type in use today can be applied with efficiency over the entire range of capability of the newest generation of computers. PL/I is proposed as a multi-purpose programming language for use by commercial, scientific, real-time and systems programmers--one which will enable each program to utilize the full capability of the computer.

In the past, a computer was generally used either for scientific or for commercial work, seldom both. Scientific work generally demanded a small amount of input and output data, with large amounts of complex calculations in between. Commercial work dealt primarily with manipulation of large data files, upon whose elements only minor calculations were performed. Hence, different types of computers — and different types of languages to be used with these computers — evolved. Programmers specialized in either field, but rarely in both.

Today, scientific programmers find they need more input/output flexibility to simplify preparation of reports, to sort data, and to analyze data on a bit level. On the other hand, commercial programmers are finding more call for complex computation, such as in operations research and statistical problems, while still handling massive amounts of data. Computer manufacturers have responded to this trend by offering equipment with ability to handle large data files with high processing speed and large internal storage.

Another aim of those who conceived and designed PL/I was achieving a standard, high-level language able to handle any problem likely to be tackled by a computer ten years from now -- certainly an important consideration in view of the years it takes for any language to become implemented, debugged, tested by users, modified and finally, if at all, widely accepted.

Does PL/I Fulfill its Purpose? -- Languages exist now which serve fairly effectively commercial or scientific areas. FORTRAN has developed over the past eight years and has become fairly well standardized and accepted for scientific work. COBOL (COmmon Business Oriented Language) is the industry-accepted standard for business programming. (It has been estimated that only 5-10% of commercial programs are now written in COBOL - the rest are done in machine assembly languages.) PL/I, then, must embody the important attributes of these languages and improve upon them. In addition, the language structure must be such that programs can easily be written for real-time systems, or shared-time systems using supervisory or control routines.

Evaluation of PL/I is being carried on by active committees in SHARE and in GUIDE (IBM 1400 Series users). Recently BEMA (Business Equipment Manufacturers Association) sponsored two week-long tutorial sessions on PL/I. These sessions were attended by representatives from all the major computer manufacturers. Comments from those who attended these sessions centered around weakensses of PL/I in the EDP area. One complaint was that "although IBM pushes mass memory, there

is nothing in PL/I to allow users to exploit these capabilities. PL/I is very weak in the area of data management of mass memory." Another weakness commented on was the lack of facility in handling real-time and time-sharing problems. Another commentator pointed out that in his opinion "PL/I has its roots very deeply in FORTRAN and ALGOL. The specification for the SORT statement (which performs the function of sorting and optionally merging records on a particular file) is not as sophisticated as that in COBOL." He also termed the "Report Writer" and "List Processing" routines as inadequate. These, however, were felt to be defects which could be remedied.

Lon Grace, manager of language systems for RCA, declared "PL/I in its present form is not the answer to the problems of the 70's." He also said that PL/I is a "procedure-oriented language which has taken care of some problems of FORTRAN and COBOL, but which needs much more work." Another spokesman, even more pessimistic about the future of PL/I, said that the language showed a "lack of consideration of implementation problems" on the part of those writing the specifications. He felt that at least a year more of serious consideration was needed before any compiler for full implementation should be written.

Still another spokesman stated that, in terms of what the industry would require three to eight years from now, PL/I contains approximately half of what it will need. He based his criticism upon his past experience with the development of other languages. He felt that <u>if</u> PL/I is carefully developed, evaluated, changed and formulated in accordance with findings of users, it could become, in about a decade, the all-purpose, standardized language it is intended to be.

<u>Is PL/I Better Than FORTRAN or COBOL?</u> -- Although this is a question immediately asked by those interested in PL/I, it is an unfair question because PL/I -- in attempting to become a universal language for all types of computer use -- <u>must</u> be different in concept from either of the other two languages. For example, there are features in PL/I better suited to business than COBOL, (for example, memory allocation flexibility), and to science than FORTRAN (n-dimensional arrays).

One can ask, however, does PL/I perform any given task <u>as well as</u> another language, keeping in mind its primary purpose of being a <u>general</u> language? The answer to this question is, for a programmer, the guideline for evaluating the merits of PL/I.

<u>Is PL/I Worth the Effort?</u> -- For an adept programmer, PL/I could be a very powerful tool. Its construction is such that maximum freedom of expression is permitted in the selection of symbols used in program statements and in input data. However, to fully utilize the language, many nuances of program statement expression must be taken into consideration.

A unique feature of PL/I called a "default" protects the unsophisticated or unwary programmer who does not completely specify aspects of his program. At every point where the language provides for one or more alternatives, a "default" interpretation — or assumption — is made by the compiler if a choice has not been specified by the programmer. This interpretation is to be the one most likely desired by a programmer who is unaware of the alternatives. Two consequences of the provision for such freedom of choice are the need for a highly complex compiler and the opportunity for nearly invisible errors — the kind that

are extremely difficult to track down — to creep into the work of a novice programmer who really doesn't understand what is happening in the compiler when the choice made by the "default" interpretation isn't what he had in mind.

"Multi-tasking" as defined in PL/I is claimed to be a unique feature of the language. It is easily confused with multi-processing, a technique now being used in several computers by IBM's competitors. Multi-processing consists of running several jobs simultaneously, with a master control system supervising assignment of storage and input and output devices. Multi-tasking performs this function and also allows parts of the same program to be run at the same time, with provision for specifying a schedule of completion for the tasks and sub-tasks within the program.

Another feature which designers of PL/I feel is unique is the "modularity" concept. The essence of this concept -- dividing a program up into independent blocks, with communication between blocks being "masterminded" by a "control" program -- is not new. What is new is the freedom of the PL/I programmer to assign the same symbols to many different blocks, as long as certain rules are followed.

Alternate methods of storage space assignments are available so that a programmer can produce a tight, efficient program with a minimum use of storage facilities. The alert programmer can be expected to increase the efficiency of this program a great deal by using this technique.

From just this brief summary of PL/I capabilities it seems obvious that any compiler which meets the specifications for the complete language must be extremely intricate. It is also fairly obvious that the advantages to be gained by using PL/I as opposed to existing languages are greatest for the advanced programmer. Paradoxically, it is largely because the architects of PL/I have introduced numerous protective devices to make the language as easy-to-learn and as foolproof as possible that the writing of a compiler is a very formidable task.

Although they are in a position to know best, IBM spokesmen have made no public estimate of the probable cost — real or comparative — of writing a compiler for PL/I. Understandably, such a cost estimate would be subject to so many variables as to be little better than an educated guess. Other software experts queried agreed that the writing of a compiler for the complete language would be a "very expensive" undertaking with cost estimates ranging up to several million dollars, depending on the complexity and efficiency desired. Comparatively, complete implementation of PL/I is expected to equal four times the cost of FORTRAN II, three times that of FORTRAN IV, and one and one fourth to twice that of COBOL.

WHEN (AND WHERE) IS PL/I?

Three types of compilers for PL/I are currently being worked on by IBM. They will be designed for use with the Operating System/360, Basic Operating System/360 and Basic Programming support for System/360. The Operating System/360 compiler will be available in two design levels, 44K and 200K. (The design-level notation, for example "44K", indicates the number of characters of storage required by that compiler.) Coupled with System/360 control programs, these compilers will require a minimum main memory of 65,536 characters and 262,144 characters, respectively. The 44K compiler is scheduled for delivery in March, '66; the 200K compiler in September, '66. Also being developed is a 10K design-level compiler for the Basic Operating System/360 scheduled for March, '66 delivery. A 16K design level card

version of PL/I for basic programming support for System/360 is scheduled for September,'66 delivery.

At present, work on the two compilers for the Operating System/360 is being carried out at IBM's laboratory in Hursley, England. The other three compilers are being developed at IBM's facilities in Germany.

EFFECT OF PL/I ON COMPETITORS

Industry reaction to PL/I seems to be one of "watchful waiting". No manufacturer likes to feel he is being forced to produce a product simply because a large competitor in the field pioneers that product. On the other hand, he cannot afford to antagonize customers who want to be able to program in commonly used programming languages. This plus the expected high implementation costs of PL/I certainly contribute to the general coolness to PL/I on the part of IBM's competitors.

We contacted representatives of IBM's seven principal competitors in the computer industry to determine their company's official position in regard to PL/I. Except for Univac, which reports it is now developing workable subsets of PL/I for implementation "if necessary" on their larger computers, each of the companies claims it is taking a strict "wait and see" attitude toward PL/I. Their general strategy is to keep a watchful eye on PL/I developments, but not to initiate compiler development expenses on PL/I until a definite competitive need exists.

Opinions on customer demand for PL/I varied considerably among computer manufacturers. At one end of the range, it was thought that if PL/I was accepted as a standard language among IBM users, customers for other machines would demand a PL/I compiler for their equipment, because they want to be program-compatible with IBM in case of a change or addition of IBM equipment. Conversely, another opinion was that the average computer user today is becoming more and more sophisticated in his knowledge and use of software and there will be no demand for PL/I unless it does satisfy a definite need of the user. From our observation post the former view appears to carry a more realistic appreciation of the likely attitude of most computer users during the next several years.

CONCLUSION

At this stage, when PL/I specifications have only recently been announced, predictions on its future acceptance and use are necessarily highly speculative. One advanced computer user (currently with three 7090's in operation) who is actively engaged in evaluating PL/I for engineering and scientific problems reports that "PL/I will do things FORTRAN won't do and is much more flexible." He believes that the flexibility offered by the new language is a great advantage and is well worth the greater possibility of error it entails. Most computer users, however, have had no exposure to PL/I on a programming level so the polls have just opened.

The ultimate success of PL/I will depend on the ease of using the language in stating problem-solving routines, on the efficiency of its compiler on the major models of System/360, and on the efficiency of the machine code it produces. Tens of millions of dollars of software development effort on the part of the computer manufacturer, and perhaps hundreds of millions of dollars programming effort on the part of computer users, will be required or spared during the next five years on the basis of the performance of PL/I as an implemented programming language. Whatever the outcome, PL/I's influence on the future fortunes of the computer industry will be considerable.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF JULY 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTALS	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	23	2
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	2	4
	ASI 6040	Y	$2800	7/65	0	4
	ASI 6050	Y	$3000	10/65	0	1
	ASI 6070	Y	$3500	10/65	0	0
	ASI 6080	Y	$4000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	55	X
	RECOMP III	Y	$1495	6/61	14	X
Bunker-Ramo Corp.	BR-230	Y	$2680	8/63	14	1
	BR-300	Y	$3000	3/59	40	X
	BR-330	Y	$4000	12/60	35	X
	BR-340	Y	$7000	12/63	19	2
	BR-530	Y	$6000	8/61	15	X
Burroughs	205	N	$4600	1/54	57	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	165	X
	B100	Y	$2800	8/64	58	32
	B250	Y	$4200	11/61	105	7
	B260	Y	$3750	11/62	190	80
	B270	Y	$7000	7/62	145	25
	B280	Y	$6500	7/62	80	25
	B370	Y	$8400	7/65	0	40
	B5000/B5500	Y	$20,000	3/63	38	11
Clary	DE-60/DE-60M	Y	$525	2/60	324	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	65	4
	DDP-116	Y	$900	4/65	5	45
	DDP-224	Y	$3300	3/65	5	20
Control Data Corporation	G-15	N	$1000	7/55	328	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	426	4
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	21	35
	3200	Y	$12,000	5/64	73	27
	3300	Y	$15,000	7/65	0	35
	3400	Y	$25,000	11/64	11	20
	3600	Y	$58,000	6/63	40	12
	3800	Y	$60,000	11/65	0	18
	6400	Y	$40,000	1/66	0	2
	6600	Y	$110,000	8/64	4	9
	6800	Y	$140,000	4/67	0	1
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	110	4
	PDP-6	Y	$10,000	10/64	9	11
	PDP-7	Y	$1300	11/64	19	50
	PDP-8	Y	$525	4/65	16	155
El-tronics, Inc.	ALWAC 111E	N	$1820	2/54	24	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	0	6
Friden	6010	Y	$800	6/63	197	191
General Electric	115	Y	$1375	12/65	0	95
	205	Y	$2900	6/64	25	15
	210	Y	$16,000	7/59	56	X
	215	Y	$6000	9/63	50	5
	225	Y	$8000	4/61	145	3
	235	Y	$10,900	4/64	48	6
	415	Y	$7300	5/64	58	80
	425	Y	$9600	6/64	30	50
	435	Y	$14,000	10/64	10	20
	625	Y	$41,000	12/64	4	21
	635	Y	$45,000	12/64	4	24
General Precision	LGP-21	Y	$725	12/62	135	X
	LGP-30	semi	$1300	9/56	410	X
	RPC-4000	Y	$1875	1/61	90	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	155
	H-200	Y	$5700	3/64	510	340
	H-400	Y	$8500	12/61	122	8
	H-800	Y	$22,000	12/60	81	0
	H-120C	Y	$6500	2/66	0	30
	H-1400	Y	$14,000	1/64	11	3
	H-1800	Y	$30,000	1/64	10	10

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTALS	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd)	H-2200	Y	$11,000	10/65	0	40
	H-4200	Y	$16,800	2/66	0	5
	H-8200	Y	$35,000	3/67	0	1
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	185	X
	360/20	Y	$1800	12/65	0	2600
	360/30	Y	$7500	4/65	45	2300
	360/40	Y	$16,000	4/65	60	650
	360/50	Y	$30,000	7/65	0	290
	360/60	Y	$48,000	8/65	0	18
	360/62	Y	$55,000	9/65	0	5
	360/65	Y	$49,000	1/66	0	80
	360/66			10/66	0	5
	360/75	Y	$78,000	11/65	0	85
	650	N	$4300	11/54	275	X
	1130	Y	$850	11/65	0	400
	1401	Y	$4500	9/60	7300	350
	1401-G	Y	$2000	5/64	900	100
	1410	Y	$14,200	11/61	780	60
	1440	Y	$3500	4/63	1900	500
	1460	Y	$9000	10/63	1800	300
	1620 I, II	Y	$2500	9/60	1750	30
	1800	Y	$3500	12/65	0	70
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	120	40
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	44	X
	7040	Y	$18,000	6/63	105	25
	7044	Y	$35,200	6/63	50	10
	705	N	$30,000	11/55	62	X
	7070, 2, 4	Y	$27,000	3/60	355	8
	7080	Y	$55,000	8/61	73	1
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	58	4
	7094	Y	$72,500	9/62	140	15
	7094 II	Y	$78,500	4/64	70	30
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	550	140
National Cash Register Co.	NCR-304	Y	$14,000	1/60	26	X
	NCR-310	Y	$2000	5/61	46	1
	NCR-315	Y	$8500	5/62	318	45
	NCR-315-RMC	Y	$12,000	9/65	0	65
	NCR-390	Y	$1850	5/61	930	60
	NCR-500	Y	$1500	9/65	0	170
Philco	100	Y	$7010	6/63	16	2
	2000-210, 211	Y	$40,000	10/58	21	2
	2000-212	Y	$52,000	1/63	9	2
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	597	15
	RCA 3301	Y	$11,500	7/64	29	20
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$2600	11/65	0	55
	Spectra 70/25	Y	$5000	11/65	0	45
	Spectra 70/45	Y	$9000	3/66	0	55
	Spectra 70/55	Y	$14,000	5/66	0	13
Raytheon	250	Y	$1200	12/60	174	8
	440	Y	$3500	3/64	11	6
	520	Y	$3200	10/64	0	7
Scientific Data Systems, Inc.	SDS-92	Y	$900	4/65	10	40
	SDS-910	Y	$2000	8/62	137	18
	SDS-920	Y	$2700	9/62	86	8
	SDS-925	Y	$2500	12/64	3	25
	SDS-930	Y	$4000	6/64	50	25
	SDS-9300	Y	$7000	11/64	11	7
Systems Engineering Labs	SEL-810	Y	$750	8/65	0	8
	SEL-840	Y	$4000	10/65	[illegible]	2
UNIVAC	I & II	N	$25,000	3/51 & 11/57	30	X
	III	Y	$20,000	8/62	88	5
	File Computers	N	$15,000	8/56	21	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	315	X
	418	Y	$11,000	6/63	24	12
	490 Series	Y	$26,000	12/61	53	22
	1004	Y	$1900	2/63	2850	250
	1050	Y	$8000	9/63	175	165
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	28	1
	1108	Y	$50,000	7/65	0	15
	LARC	Y	$135,000	5/60	2	X
				TOTALS	27,765	10,684

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070, and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

July 26 - September 17, 1965

	1965 High	1965 Low	8 weeks Sales in 100's	8 weeks High	8 weeks Low	Last	8 weeks Net Change	8 weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	55 7/8	41 1/8	3518	51 7/8	42 1/2	51 3/4	+7 3/8	+16.62
American R & D	25 1/2	17 5/8	429	20 1/2	17 7/8	19 1/8	+3/8	+2.00
Burroughs	39	24 7/8	5397	38 3/8	31 5/8	37 5/8	+5 1/2	+17.12
Control Data	64 1/4	30 1/4	18,866	38	30 1/4	35 1/8	+1	+2.93
Dura Corp.	33 1/8	19 3/4	387	25 7/8	19 3/4	24 5/8	+3 1/2	+16.56
Electronic Associates	27	16 3/4	2685	24 3/4	19 5/8	22 3/8	+1 5/8	+7.83
General Dynamics	45 1/2	35	10,872	46 3/4	38 5/8	41 1/2	+1/8	+0.30
General Electric	112 1/2	91	5721	112 1/2	96 5/8	112	+14 1/4	+14.58
Honeywell	75 3/8	58 1/4	3021	73 1/8	59 5/8	72 3/8	+10 1/2	+16.97
IBM	514 3/4	404	2630	514 3/4	461 1/2	514 3/4	+48 3/4	+10.46
Inter. Tel. and Tel.	63 7/8	48 3/4	4265	57 1/8	48 3/4	55 7/8	+4 5/8	+9.02
Litton	116 7/8	74 5/8	5297	116 7/8	87 3/8	116 1/4	+28 5/8	+32.67
Nat. Cash Register	91 3/4	74	1419	80 5/8	75 1/4	76 5/8	+1 1/4	+1.66
RCA	40 1/4	31	18,993	40 1/4	33 1/4	39 3/4	+8 7/8	+17.34
Raytheon	33 3/4	19	11,710	33 3/4	22 3/4	33 5/8	+11 1/8	+49.44
SCM	31	16 1/4	12,406	31	17 1/4	30 3/4	+12 1/2	+68.49
Singer	83 1/4	59	3559	67 1/2	59	64 7/8	+3 7/8	+6.35
Sperry Rand	15 3/4	11 1/8	17,986	15 5/8	11 5/8	14 3/4	+3 1/8	+26.88
NYSE COMPUTER STOCK AVERAGE							+9.11	+17.62
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	1030	23 7/8	19 3/4	22 7/8	+3/8	+1.67
Bunker-Ramo	11 1/4	5 7/8	1229	8	5 7/8	7 1/2	+1 1/2	+25.00
Cal Comp	24	13	378	18	13 3/8	17 1/4	+3 3/8	+24.32
Clary	6 1/8	3 3/8	182	4 1/8	3 3/8	3 5/8	-1/8	-3.33
Computer Applications	32 1/4	15 3/4	747	21 5/8	16 3/8	18	-1 3/8	-7.10
Computer Sciences	59 1/2	19 5/8	2982	55 3/4	46 3/8	54	+2 7/8	+5.62
Milgo Elec.	12 5/8	8 1/4	110	9 7/8	8 1/4	9 1/4	+1/8	+1.37
Planning Research	33 3/4	12 1/8	396	26	22	26	+3 3/4	+16.85
Potter Instrument	10 1/2	6 5/8	864	10 1/2	7 1/8	9 1/2	+2 1/8	+28.81
AMEX STOCK AVERAGE							+1.40	+10.36

	1965 High Bid	1965 Low Bid	Sept. 17 Bid	Sept. 17 Asked	8 weeks ago Bid
OVER-THE-COUNTER					
CEIR	13 1/2	7	12	12 1/4	10 3/4
Computer Usage	30 3/4	13 1/4	19 1/2	21 1/2	18
Computer Control	17 1/8	8	10 1/8	10 3/8	10 5/8
Digitronics	7 1/4	3 7/8	6 7/8	7 1/4	5 3/8
Management Assistance	59	29 1/4	58 3/4	59 3/4	33 3/4
Scientific Data	44 3/4	31 3/4	36	36 1/2	34

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

IBM ADJUSTS MAINTENANCE RATES, ELIMINATES PRICE REDUCTION ON BASIS OF EQUIPMENT AGE, IN MOVE TO CONTROL PERCENTAGE OF ITS RENTED DP EQUIPMENT BEING PURCHASED

"The greatest difficulty in achieving forecasted goals of profitability in the computer industry is controlling the mix of sales vs. rentals of equipment", Control Data's President William Norris was quoted as saying at CDC's Annual Meeting last month. No firm in the computer field is more conscious of this problem, nor more able to pioneer pricing policies to astutely control it, than IBM.

An example of IBM's exercise of this control is its announcement to its customers on October 1, 1965, outlining new arrangements under which a customer can purchase rented IBM equipment, and also adjustments on the maintenance charges that customers with purchased IBM computers or punched card equipment are required to pay for IBM service on their equipment. To explain these changes, let's contrast them with policies previously in effect.

"Purchase-of-Rented" Plan

Prior to October 1st, the purchase price of rented IBM computers and punched card equipment to a customer with the equipment installed was based on the length of time the equipment was installed. For computers, the purchase price declined 5% a year for the first four years of use, and 10% thereafter until a minimum price of 65% of list was reached at the end of 5½ years. For punched card equipment, the purchase price declined to a minimum of 45% of list for equipment still in production, 35% of list for equipment out-of-production but still available in the market, and 25% of list for equipment both out-of-production and no longer available on a used basis from IBM.

On October 1st, IBM declared by fiat that age is no longer a factor in determining the economic value of equipment to a customer. Instead, IBM pointed to economic and technological change as the primary factors in determining the economic value of IBM equipment for its users. On that premise, IBM has frozen the purchase price to a renting customer of all its currently installed computers and punched card equipment at the value each achieved as of October 1, 1965.

A consequence of this action is that IBM has raised the sale price of its used data processing equipment in inventory to 100% of the list price for similar new equipment. Also, a punched card customer may well find, for example, that two 407 accounting machines at his installation, both with the same date of

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manufacture and both yielding the same performance, might have sale prices of $24,000.00 and $55,000.00 respectively...based on the fact that the former one has been in use at his particular installation for eight years while the latter was installed only a few months ago.

"Option-to-Purchase" Plan

Prior to October 1st, customers renting IBM equipment could obtain an "Option-to-Purchase" contract which allowed them to apply between 45% and 55% of the first year rental payments for their equipment toward the purchase price of the equipment. The fee for entering into this contract was the payment of 1% of the purchase price of the equipment ninety days prior to its installation.

Starting October 1st, IBM no longer offers this contractual arrangement. In its place, IBM now allows all customers renting its data processing equipment the opportunity to apply 40% to 60% (depending on the equipment) of the first year rental payments toward the purchase price of the equipment. The actual percentage of rental applied on each type of equipment has been extensively changed under the new plan. For example, under the previous plan, 45% of the first year rental on central processors and 55% on peripheral equipment was credited against the purchase price; under the new plan, the percentages are reversed.

Therefore, under the new IBM regulations for the purchase of rented equipment, the minimum purchase price of IBM rented data processing equipment installed after October 1, 1965, will be 88% - 89% of the full list price (since IBM's purchase/lease ratio on most data processing equipment is roughly 50/1, one half of the first year's rental equals approximately 6/50th or 12% of the purchase price).

Maintenance Prices

IBM has announced sharp increases in maintenance charges for customers using certain purchased IBM equipment. For example, on January 1, 1966, maintenance charges on a purchased IBM 1402 card reader/punch less than three years old will be increased from $50.25 per month to $120.00 per month, an increase of 140%! This effectively changes the breakeven point on a decision to purchase versus rent this unit from just over 59 months to over 68 months...a 15% longer pay-back period for users with an IBM maintenance contract on this equipment. This increase has a stiff impact on IBM competitors offering IBM peripherals such as the 1402 as part of their product lines. Readers will recall that IBM now requires its competitors to purchase rather than rent such equipment.

To reconcile IBM's declaration in its new purchase price policy that age has no effect on the performance value of its equipment, IBM has established a single monthly maintenance fee for each of its data processing units. Formerly maintenance charges increased with the age of the machine in three year cycles.

IBM has also increased maintenance charges for customers receiving maintenance on a time and materials basis. The hourly labor charge has been increased 20%, from $15 to $18 per hour. Overtime charges have been increased similarly.

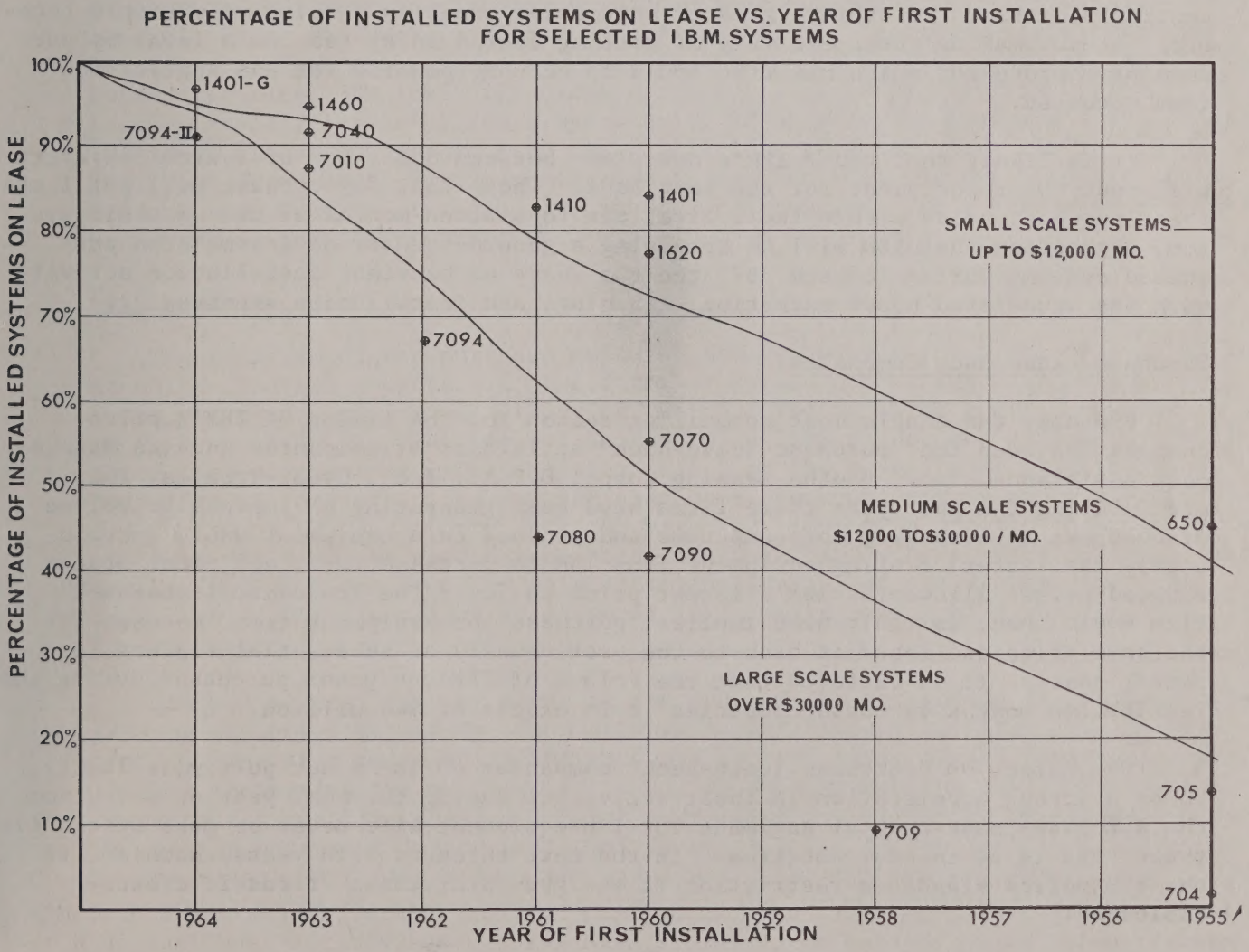
IBM press announcement on the subject declared that "because of continuing improvements in IBM's maintenance and reconditioning programs, it is possible to provide equivalent performance levels in machines with different dates of manufacture." These improvements have apparently not come easily, for since 1963 IBM's monthly maintenance charges to customers with purchased equipment have increased

80% for punched card equipment and 100% for computers. Since these increases in maintenance charges have not been made with a concomitant increase in rental rates for computers and punched card equipment, IBM has been in effect increasing the equivalent purchase price of their equipment between 10% - 20% during the last three years.

The new IBM announcement appears to be but one of a series of carefully planned moves IBM has been making during the last four years to control the percentage of its computer and punched card equipment being purchased. The previous increases in maintenance charges to customers with purchased IBM equipment, and the shortening of the period during which a percentage of rental payments could be applied to the purchase price from two years to one year, are examples of these moves. Their overall objective, of course, is to maintain IBM's profit goals in the years ahead. Three prominent reasons motivating these changes at this time are (1) the expected long market life of System/360, (2) the activities of purchase-lease-back companies, and (3) the used computer market.

Long Market Life of System/360

As indicated in the chart below, the percentage of currently installed IBM



computers purchased increased under the former "Option-to-Purchase" plan in rough proportion to their length of service on the market...taking into account that the rate of purchase was lower for small-scale systems and higher for large-scale systems. This is easily understood in light of IBM's former policy of reducing the purchase price of equipment with each year of service.

Since the System/360 is envisioned by IBM as being a series of computer systems actively marketed and in use for ten or more years, IBM is anxious to keep a high percentage of installed systems on rental so that they will provide highly profitable revenues to IBM during the latter half of their decade of use. IBM apparently reasons that customers likely to purchase their system in any case will do so by the end of the first year of use - reacting to the incentive of the 11% to 12% discount - rather than delaying for two or more years the decision to purchase. Customers not being able to make a decision to purchase by the end of the first twelve to eighteen months of use will probable continue to rent their 360 system indefinitely, since the purchase price on their aging equipment will remain fixed.

Two other factors that will discourage users of 360 equipment from purchasing are: (a) the rapid advances being promised in peripheral equipment, especially in the areas of printers, optical character recognition units, displays, and mass memories, and (b) the program compatibility between models of 360 make upgrading of the central processor to achieve greater processing capacity a relatively simple technical step...making customers wary of getting locked in at too low a level by purchasing a processor which might be found to be underpowered for the application load required.

It is likely that under IBM's new plan between 80% - 85% of System/360 users will rent their equipment for the long haul. Those that do purchase will put forth their purchase price within their first six to sixteen months of use of their system, suggesting that IBM will be receiving a generous share of income from purchased systems during '66 and '67, the two years of heaviest installation activity with its associated heavy marketing, training, and installation expenses.

Purchase-Lease-Back Companies

Probably the single most compelling reason for the timing of IBM's price changes has been the "purchase-lease-back" activities of companies such as Management Assistance, Inc., Boothe Leasing Corp., D.P.A., Inc., Cyber-Tronics, Inc., etc. During the past year these firms have been generating an impressive volume of business by arranging for computers and punched card equipment users (particularly the latter) renting equipment from IBM to purchase their equipment at the reduced prices allowed by IBM's former price policy. The "purchase-lease-back" firm would then, as their name implies, purchase the equipment from the user for the same price and lease it back to the user usually at substantial savings in rental costs. It is believed that the volume of IBM equipment purchased during the last twelve months by these companies is in excess of $40 million.

The effect on "purchase-lease-back" companies of IBM's new policy is likely to be a strong acceleration in their activities during the next year or so, since the purchase-lease-back arrangement for IBM equipment will never be more attractive than it is at the current time. In the next three to five years, however, if the IBM policy stands, a restriction in the growth of these firms is clearly indicated.

It is highly likely that because IBM's new policy has a direct adverse economic impact on "purchase-lease-back" companies, the policy will be challenged in the courts as an artificial measure designed to restrain the trade of independent companies purchasing and maintaining IBM equipment. Certainly, the elimination of IBM's former "Purchase-of-Rented" plan seems in strong contrast to the spirit behind the wording of the so-called IBM Consent Decree, the agreement drafted by the United States Justice Department and signed by IBM on January 25, 1956. This judgement, the requirements of which officially expire next January, required IBM to offer to sell to any customer renting an IBM tabulating or electronic data processing machine that equipment at a sale price "which should not be greater than the sale price for a new machine of the same type and model less 10% for each full year of age, computed from the date of first installation after original assembly or rebuilding, except that for machines of more than eight years the price may be more than 25% of such sales price." This agreement was binding only during the period of eighteen months from the signing of the judgement. However, since the judgement did direct IBM to be non-discriminatory in offering customers the opportunity to purchase as well as rent its equipment, its spirit is likely to be invoked in challenging IBM's new purchase policy.

Logically, IBM should be anxious to curtail the activities of "purchase-lease back" firms for two reasons. First, IBM loses profitable rental income on its data processing equipment, particularly punched card equipment, that is usually fully depreciated on its books. Second, since many of the "purchase-lease-back" firms provide their own maintenance service, or arrange for maintenance service through outside sources, IBM loses its close service relationship with its customers, thereby greatly lessening IBM's opportunity to upgrade the customer's equipment to a more elaborate punched card installation or to a computer. In fact, one "purchase-lease-back" firm reports that in over half of the punched card installations purchased by it which have subsequently upgraded to a computer, the computer was of non-IBM manufacture.

Used Computer Market

The freezing of the purchase price of IBM computer systems raises the ceiling at which used IBM computers of the first or second generation will be able to enter the used computer market during the next two to three years. However, since even under the "Purchase-of-Rented" plan, IBM's purchase prices were well above that of the free market, little effect on the quantity or price of used computers is foreseen. The new IBM plan does, however, firmly squelch suggestions made by some EDP consultants that IBM might be planning a drastic reduction in the purchase price of its second generation equipment in order to make a final "cash-in" on the 1400/7000 series prior to quantity deliveries of the System/360. The naivete of such assumptions in terms of IBM's market and profit goals is now clearly seen.

IBM has several further moves it can make if the percentage of its data processing equipment rented by its customers is not brought on target by the new policy. One step is to shift the purchase to rent ratio of its equipment upward, thereby increasing the purchase price of its data processing equipment without changing its monthly rental. IBM has made several purchase price changes on data processing equipment in the past, but is quite proud of the fact that only once in the recent past (in 1956, after signing the Consent Decree) did it ever change the rental price of some of its equipment. The second measure that IBM can take

(Continued on Page 8)

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF AUGUST 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTALS	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Addressograph-Multigraph Corporation	EDP 900 system	Y	$7500	2/61	11	1
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	23	2
	ASI 2100	Y	$3000	12/63	6	0
	ASI 6020	Y	$2200	4/65	3	4
	ASI 6040	Y	$2800	7/65	1	4
	ASI 6050	Y	$3000	10/65	0	1
	ASI 6070	Y	$3500	10/65	0	0
	ASI 6080	Y	$4000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	55	X
	RECOMP III	Y	$1495	6/61	14	X
Bunker-Ramo Corp.	BR-130	Y	$2000	10/61	170	10
	BR-230	Y	$2680	8/63	14	1
	BR-300	Y	$3000	3/59	40	X
	BR-330	Y	$4000	12/60	35	X
	BR-340	Y	$7000	12/63	19	2
	BR-530	Y	$6000	8/61	15	X
Burroughs	205	N	$4600	1/54	56	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	163	X
	B100	Y	$2800	8/64	60	35
	B250	Y	$4200	11/61	104	7
	B260	Y	$3750	11/62	205	65
	B270	Y	$7000	7/62	148	25
	B280	Y	$6500	7/62	85	25
	B300	Y	$8400	7/65	2	45
	B5000/B5500	Y	$20,000	3/63	39	11
Clary	DE-60/DE-60M	Y	$525	7/60	325	3
Computer Control Co.	DDP-19	Y	$2800	6/61	3	X
	DDP-24	Y	$2500	5/63	66	4
	DDP-116	Y	$900	4/65	6	45
	DDP-224	Y	$3300	3/65	8	22
Control Data Corporation	G-15	N	$1000	7/55	328	X
	G-20	Y	$15,500	4/61	26	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	426	4
	924/924A	Y	$11,000	8/61	28	1
	1604/1604A	Y	$38,000	1/60	60	X
	3100	Y	$7350	12/64	24	35
	3200	Y	$12,000	5/64	76	30
	3300	Y	$15,000	8/65	0	35
	3400	Y	$25,000	11/64	12	20
	3600	Y	$58,000	6/63	42	11
	3800	Y	$60,000	11/65	0	20
	6400	Y	$40,000	1/66	0	3
	6600	Y	$110,000	8/64	4	10
	6800	Y	$140,000	4/67	0	1
Digital Equipment Corp.	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	4
	PDP-6	Y	$10,000	10/64	10	11
	PDP-7	Y	$1300	11/64	14	55
	PDP-8	Y	$525	4/65	45	160
El-tronics, Inc.	ALWAC IIIE	N	$1820	2/54	24	X
Electronics Associates, Inc.	8400	Y	$7000	6/65	1	6
Friden	6010	Y	$600	6/63	200	188
General Electric	115	Y	$1375	12/65	0	100
	205	Y	$2900	6/64	28	15
	210	Y	$16,000	7/59	56	X
	215	Y	$6000	9/63	50	5
	225	Y	$8000	4/61	145	3
	235	Y	$10,900	4/64	51	6
	415	Y	$7300	5/64	62	75
	425	Y	$9600	6/64	35	55
	435	Y	$14,000	10/64	11	20
	625	Y	$41,000	12/64	5	22
	635	Y	$45,000	12/64	5	26
General Precision	LGP-21	Y	$725	12/62	130	X
	LGP-30	semi	$1300	9/56	400	X
	RPC-4000	Y	$1875	1/61	80	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	160
	H-200	Y	$5700	3/64	555	310
	H-400	Y	$8500	12/61	122	8
	H-800	Y	$22,000	12/60	83	8
	H-1200	Y	$6500	2/66	0	33
	H-1400	Y	$14,000	1/64	12	2
	H-1800	Y	$30,000	1/64	11	9

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (cont'd.)	H-2200	Y	$11,000	10/65	0	42
	H-4200	Y	$16,800	2/66	0	6
	H-8200	Y	$35,000	3/67	0	1
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	180	X
	360/20	Y	$1800	12/65	0	2700
	360/30	Y	$7500	5/65	55	2350
	360/40	Y	$16,000	4/65	70	650
	360/50	Y	$30,000	8/65	0	300
	360/60	Y	$48,000	8/65	0	16
	360/62	Y	$55,000	9/65	0	5
	360/65	Y	$49,000	1/66	0	85
	360/67	Y	$49,000	9/66	0	7
	360/75	Y	$78,000	11/65	0	85
	650	N	$4800	11/54	270	X
	1130	Y	$850	11/65	0	1050
	1401	Y	$4500	9/60	7100	300
	1401-G	Y	$2000	5/64	1000	100
	1410	Y	$14,200	11/61	760	50
	1440	Y	$3500	4/63	2000	450
	1460	Y	$9000	10/63	2000	350
	1620 I, II	Y	$2500	9/60	1750	30
	1800	Y	$3500	12/65	0	75
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	140	60
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	43	X
	7040	Y	$18,000	6/63	108	22
	7044	Y	$35,200	6/63	55	8
	705	N	$30,000	11/55	61	X
	7070, 2, 4	Y	$27,000	3/60	352	8
	7080	Y	$55,000	8/61	73	1
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	56	4
	7094	Y	$72,500	9/62	135	15
	7094 II	Y	$78,500	4/64	77	30
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only - $5800	3/58	155	X
	Monrobot XI	Y	$700	12/60	560	130
National Cash Register Co.	NCR-304	Y	$14,000	1/60	26	X
	NCR-310	Y	$2000	5/61	46	1
	NCR-315	Y	$8500	5/62	330	35
	NCR-315-RMC	Y	$12,000	9/65	0	75
	NCR-390	Y	$1850	5/61	960	60
	NCR-500	Y	$1500	9/65	0	200
Philco	1000	Y	$7010	6/63	16	2
	2000-210 211	Y	$40,000	10/58	21	2
	2000-212	Y	$52,000	1/63	9	2
	2000-213	Y	$68,000	6/65	0	1
Radio Corp. of America	Bizmac	N	$100,000	-/56	3	X
	RCA 301	Y	$6000	2/61	600	12
	RCA 3301	Y	$11,500	7/64	33	22
	RCA 501	Y	$14,000	6/59	98	2
	RCA 601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$2600	11/65	0	60
	Spectra 70/25	Y	$5000	11/65	0	50
	Spectra 70/45	Y	$9000	3/66	0	60
	Spectra 70/55	Y	$14,000	5/66	0	13
Raytheon	250	Y	$1200	12/60	170	10
	440	Y	$3500	3/64	12	5
	520	Y	$3200	10/65	0	8
Scientific Data Systems, Inc.	SDS-92	Y	$900	4/65	15	40
	SDS-910	Y	$2000	8/62	140	25
	SDS-920	Y	$2700	9/62	88	15
	SDS-925	Y	$2500	12/64	4	22
	SDS-930	Y	$4000	6/64	54	25
	SDS-9300	Y	$7000	11/64	11	8
Systems Engineering Labs	SEL-810	Y	$750	8/65	0	8
	SEL-840	Y	$4000	10/65	0	3
UNIVAC	I & II	N	$25,000	3/51 & 11/57	29	X
	III	Y	$20,000	8/62	88	5
	File Computers	N	$15,000	8/56	20	X
	Solid-State 80 I, II, 90 I, II & Step	Y	$8000	8/58	310	X
	418	Y	$11,000	6/63	26	12
	490 Series	Y	$26,000	12/61	55	27
	1004	Y	$1900	2/63	2900	250
	1050	Y	$8000	9/63	180	160
	1100 Series (except 1107)	N	$35,000	12/50	13	X
	1107	Y	$45,000	10/62	28	1
	1108	Y	$50,000	7/65	0	15
	LARC	Y	$135,000	5/60	2	X
				TOTALS	28,415	11,911

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

September 20, 1965 - October 1, 1965.

	1965 High	1965 Low	2 Weeks Sales in 100's	2 Weeks High	2 Weeks Low	Last	2 Weeks Net Change	2 Weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	61 3/8	41 1/8	4174	61 3/8	52	56 1/8	+ 4 3/8	+ 8.45
American R & D	25 1/2	17 5/8	202	20	18 1/4	19 3/4	+ 1/2	+ 2.60
Burroughs	42 1/2	24 7/8	5654	42 1/2	37 3/8	40 1/8	+ 2 3/4	+ 7.31
Control Data	64 1/4	30 1/4	4638	35 3/4	31	31 3/4	- 3 3/8	- 9.61
Dura Corp.	33 1/8	19 3/4	98	24 1/2	21 3/4	21 3/4	- 2 7/8	-11.68
Electronic Associates	27	16 3/4	635	23 1/8	20 1/4	20 7/8	- 1 1/2	- 6.70
General Dynamics	46 7/8	35	5874	46 7/8	40 3/4	45 1/2	+ 4	+ 9.64
General Electric	120 1/4	91	2705	120 1/4	111 5/8	116 7/8	+ 4 7/8	+ 4.35
Honeywell	79 3/4	58 1/4	1666	79 3/4	71 1/2	75	+ 2 5/8	+ 3.63
IBM	517 1/4	404	584	517 1/4	503 1/4	507	- 7 3/4	- 1.51
Inter. Tel. and Tel.	63 7/8	48 3/4	1239	55 7/8	54	54 1/8	- 1 3/4	- 3.13
Litton	118 7/8	74 5/8	1431	118 7/8	108 5/8	109 1/8	- 7 1/8	- 6.13
Nat. Cash Register	91 3/4	74	784	81 3/4	75 1/4	75 1/2	- 1 1/8	- 1.47
RCA	47 3/8	31	17858	47 3/8	39 5/8	44 1/8	+ 4 3/8	+11.01
Raytheon	34 3/8	19	3714	34 3/8	30	31 1/8	- 2 1/2	- 7.43
SCM	51 5/8	16 1/4	31274	51 5/8	32 1/2	41 1/8	+10 3/8	+33.94
Singer	83 1/4	59	1025	66 7/8	61 1/4	66	+ 1 1/8	+ 1.73
Sperry Rand	16	11 1/8	11284	16	13 3/4	15	+ 1/4	+ 1.69
NYSE COMPUTER STOCK AVERAGE							+ 0.40	+ 2.03
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	319	23	20 1/2	21 1/4	- 1 5/8	- 7.10
Bunker-Ramo	11 1/4	5 7/8	379	7 3/4	7	7	- 1/2	- 6.67
Cal Comp	24	13	91	17 3/4	14 3/4	14 7/8	- 2 3/8	-13.77
Clary	6 1/8	3 1/8	126	3 3/4	3 1/8	3 1/8	- 1/2	-13.79
Computer Application	32 1/4	15 3/4	593	24 3/4	18 3/8	23 1/8	+ 5 1/8	+28.47
Computer Science	62 1/4	19 5/8	1005	62 1/4	50 5/8	59 3/4	+ 5 3/4	+10.65
Milgo Elec.	12 5/8	8 1/4	36	9 1/4	8 1/2	8 1/2	- 3/4	- 8.11
Planning Research	33 3/4	12 1/8	434	30 3/8	26 3/4	28 1/4	+ 2 1/4	+ 8.65
Potter Instrument	10 1/2	6 5/8	120	9 5/8	8 1/2	9 1/4	- 1/4	- 2.63
AMEX STOCK AVERAGE							+ 0.79	- 0.48

	1965 High Bid	1965 Low Bid	October 1 Bid	October 1 Asked	2 Weeks ago Bid
OVER-THE-COUNTER					
CEIR	13 1/2	7	11 7/8	12 1/8	12
Computer Usage	30 3/4	13 1/4	19 3/4	21 3/4	19 1/2
Computer Control	17 1/8	8	8 1/2	9	10 1/8
Digitronics	7 1/4	3 7/8	6 5/8	7	6 7/8
Management Assistance	59	29 1/4	47 3/4	48 3/4	58 3/4
Scientific Data	44 3/4	31 3/4	35	35 1/2	36

(Continued from Page 5)

is to withdraw its "Option-to-Purchase" plan entirely, thereby allowing no application of paid-in-rental toward the purchase price of its rented equipment. Since the new "Option-to-Purchase" plan does not involve a contractual arrangement as did the previous one, IBM is free to make this change in the future with a minimum of thirty days notice to its customers.

Both these moves, of course, would offer some additional competitive price advantage to IBM competitors in the computer industry. However, this effect might well be outweighed by the additional profits to be realized by the rental income coming from a generous share of the 65% to 75% of the computer market IBM is expected to maintain command of in the 1970's.

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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SURVEY OF EARLY SYSTEM 360 USERS REVEALS SATISFACTION WITH HARDWARE, PROBLEMS WITH SOFTWARE.

It has been nearly nineteen months since IBM announced its System/360 computer series and six months since initial deliveries to commercial customers started. Currently, there are approximately 60-70 IBM 360 Series computers (excluding IBM's own installations) operating in various domestic organizations, while an estimated 1,000 - 1,200 are awaiting delivery in the United States within the next six months.

The experiences of the initial customers of a computer series are quite important both to the computer manufacturer and to other prospective users. The manufacturer monitors his initial installations closely...using them discreetly as a testing ground for his equipment. Any systems hardware or software difficulties encountered by initial users will have to be overcome by the manufacturer before quantity deliveries commence. Prospective users are often considerably influenced by reports and rumors of the successes and problems of these initial installations...frequently delaying delivery or changing an order based upon this early user reaction.

In order to learn of the experiences of initial users of System/360 first hand and to assess their attitudes, EDP I&M Report conducted a telephone survey of about 20% of the organizations with System/360 computers installed between April and August of this year. The users interviewed included organizations doing scientific research, spare parts manufacturing, printing and publishing, and contract engineering studies.

The survey questions were directed towards the manager of the computer installation at the company involved. We received good cooperation and to the best of our knowledge direct and honest answers to our queries.

The questions asked to each user were:

1. WHAT COMPUTERS DID YOU PREVIOUSLY OPERATE?

   These companies all previously operated IBM computers, usually the 1400 Series. With the exception of one firm, they are phasing out their old computers over a six to nine month period. (The company that is not removing

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its 1401 will use the machine for small production runs.) In all cases, the computers being replaced were operated on a rental basis and will be returned to the manufacturer.

2. IS THE 360 IN OPERATION? IF SO, HOW MUCH TIME IS BEING USED? HOW MUCH "DOWN-TIME" ARE YOU EXPERIENCING? ("Down-time" is the period in which a computer is not able to be used due to machine malfunctions or mechanical difficulties.)

   Nearly all organizations are operating their 360 equipment on a three shift basis five to six days per week. None of these firms have experienced any significant "down-time."

3. IS YOUR 360 RENTED?

   In every installation surveyed, the answer was "yes."

4. DID THE HARDWARE PERFORM UP TO YOUR EXPECTATIONS?

   All the managers expressed excellent satisfaction with the hardware, even though occasional mechanical difficulties, such as tapes not responding properly to signals from the processing unit, were experienced by two users.

5. WHAT IS YOUR EVALUATION OF THE SOFTWARE AND PROGRAMMING SUPPORT PROVIDED FOR SPECIALIZED AND NON-SPECIALIZED APPLICATIONS?

   This was the only area where users said they experienced serious problems. One user declared, "there is a definite lack of professional quality in the software. Much of it appears to have been written by one of those 'ninety day wonder' programmers." Another user stressed he felt it was improper for his firm to work out any bugs in the programs written by the manufacturer's personnel...but that he was wasting a considerable amount of valuable and expensive time doing just that. Even though most such software problems were reported by users as having "quieted down" within three months after the machine's installation, they were quite "un-nerving" to the data processing managers involved.

6. ARE YOU RUNNING ANY PROGRAMS IN THE COMPATIBILITY MODE BETWEEN THE 360 AND YOUR 7000/1400 SERIES EQUIPMENT? DO YOU FIND THE COMPATIBILITY TO BE WHAT YOU EXPECTED?

   Only one firm is operating the emulator (1401 emulator on a model 40) feature and they were satisfied with its performance. Several other companies have the emulator on order.

7. HOW DO YOU RATE THE TRAINING PROGRAM FOR PROGRAMMERS? OPERATORS?

   The two companies which sent their personnel to 360 programming school expressed favorable comments about their programmers' resulting performance in all areas except input/output control. IBM did not have its 360 I/O package available during the training sessions. None of the operators from the firms interviewed received any formal training, but received "on-the-job" instruction with IBM manuals and customer engineers.

8. HOW IS THE MAINTENANCE SERVICE?

The maintenance service was rated as excellent in all cases.

9. WHAT IS YOUR ESTIMATED LENGTH OF SERVICE WITH THE 360 MODEL NOW INSTALLED?

The answers to this questions varied considerably. One firm is using their model 40 strictly as an interm machine until the recently announced model 44 is available some time next year. Another company felt their estimated length of service will be about three to four years because this has been their past experience with IBM computers. Still another organization will use their 360/40 model only until model 67 is delivered next year for time-sharing applications.

10. DO YOU HAVE AN ESTIMATE OF START-UP COSTS? WHAT IS THE PERCENTAGE OF INCREASE OR DECREASE IN YOUR RENTAL FOR THE 360 INSTALLATION VERSUS YOUR PREVIOUS EQUIPMENT?

Unfortunately, the majority of the firms queried were unable to estimate their set-up costs. However, one user expected an annual savings of $20,000 or a 10% cost reduction in relation to what his previous computer installation would have cost to do the same amount of processing. (The surveyed 360 installations cost between 20% to 50% more in monthly rental.)

CONCLUSION:

The results of the survey indicate that, in general, the early users of System/360 are enthusiastic about the efficiency of their hardware, but critical of the performance of the software they have received thus far. It appears that IBM's software development was far from mature at the time the initial 360 systems were delivered. Although surveyed users have presently satisfied their needs by making necessary adjustments to the systems software, these adjustments have been unquestionably time-consuming, annoying, and quite costly to the users.

Although problems with the performance of software delivered with newly introduced computer systems are quite common in the industry, IBM appears to have been less adequately prepared with capable software for early 360 users than its position in the industry would suggest. Major pieces of systems software such as compilers for FORTRAN, COBOL, AND PL/I have slipped sharply in expected delivery dates. Lately, IBM has even been unwilling to quote firm delivery dates on major pieces of advanced 360 software.

Some conclusions which can be drawn from the reaction of the surveyed 360 users include:

1. The problems with software suggest that deliveries of 360 systems will probably fall considerably behind schedule this year. It is very unlikely that IBM will even approach the "more than one thousand 360 installations" Chairman Watson predicted at last April's Annual Meeting would be achieved by the close of this year.

2. Reliability problems stemming from the use of microelectronic hybrid circuitry in 360 have apparently not occurred. In fact, the performance of the installed systems surveyed has been well above industry expectations

for such early arrivals from the production line.

3. The release of second generation computers by 360 users is currently being scheduled over a six to nine month period after the installation of the replacing 360 unit. Since the first eighteen months of 360 deliveries are scheduled primarily to users renting currently installed computers, IBM will be taking back considerable quantities of 1400/7000 series of equipment starting in the second half of '66. Current owners of 1400/7000 series computers will probably not be releasing their equipment into the used computer market until the latter part of '67.

FEDERAL GOVERNMENT SPENDING FOR DATA PROCESSING IN FISCAL '65 ESTIMATED TO BE OVER $1.1 BILLION; IBM'S SHARE OF UNCLE SAM'S COMPUTERS DECLINES TO 46%

The Federal Government, the nation's largest computer user...employing just over 10% of all computers in use in the U.S....spent an estimated $1132 million for data processing in the Fiscal Year ending June 30, 1965. Of this amount, $441 million, or 39% of the total, is estimated as the cost for the rental or purchase of computers ($203 million for rental and $238 million for purchase).

These figures, and scores of others, are reported in the publication "Inventory of Automatic Data Processing Equipment in the Federal Government" issued recently by the U.S. Bureau of the Budget. This is the third consecutive year that such an inventory has been prepared and published through the efforts of the Management Improvement and Research Branch of the Bureau of the Budget's Office of Management and Organization. This year's edition, 365 pages long, is available for $2.00 from the U.S. Government Printing Office, Washington, D.C. 20402.

A selection of other significant statistics about the computer industry provided by this publication are:

* 2188 computers were in use in the Federal Government by the end of June, 1965, compared to 1767 at the end of June, 1964...an increase of 24%. This number is expected to rise to 2451 by the end of June, 1966...an increase of 12% during the year.

* IBM supplied 999 of the computers in use in the Federal Government as of June, 1965, accounting for 46% of the total. In June 1964, their share of installed computers was 53%. By June, 1966, it is expected to decline to 36%.

* Control Data, benefiting from the addition of some 33 installed computer systems acquired from General Precision, has moved into a secure second place in the government market with 243 systems installed...11% of the total. NCR, which was in the second place in June, 1964, slipped to third place this year with 196 systems installed, 9% of the total.

* Total costs for data processing in the Federal Government is expected to rise to an estimated $1148 million in Fiscal,'66...an increase of less than 2%. However spending for the rental or purchase of computers is expected to increase some 9% to $481 million in Fiscal,'66. This increase is expected to be accounted for almost entirely by stepped-up purchasing of computers.

* The percentage of purchased computers in use in the Federal Government rose from 39.7% as of June, 1964, to 45.2% as of June, 1965. By June, 1966, the percentage of purchased computers is expected to rise to 49.2%.

* By June, 1966, 37 government agencies will be using computers at some 923 computer units...each computer unit being defined as a separate administrative site for a computer installation.

* The Department of Defense operates 1497 computers, or 68%, of the current government total. It accounts for 60% of the total government bill for data processing. NASA is the next largest user, using 11% of government computers and accounting for 17% of DP spending. In third place is the AEC, using 8% of government computers, accounting for 7% of the DP spending.

The chart below gives a breakdown of the number of systems installed or expected to be installed, in the Federal Government, and the number and percentage of currently installed equipment which is purchased.

MANUFACTURER	NUMBER OF COMPUTERS INSTALLED IN FEDERAL GOVERNMENT			EST. NO. COMPUTERS, PURCHASED, JUNE, 1965	PERCENT COMPUTERS PURCHASED
	JUNE 1964	JUNE 1965	JUNE 1966 (Est.)		
IBM	940	999	888	370	37%
Control Data (Includes General Precision)	195	243	243	148	61%
NCR	190	196	197	5	3%
Univac	96	187	330	126	67%
RCA	97	132	132	70	53%
Burroughs	30	98	164	22	24%
Honeywell EDP	25	66	90	35	53%
General Electric	36	53	44	21	40%
Scientific Data Systems	18	40	43	33	83%
Digital Equipment	20	31	35	31	100%
All others	120	143	286	127	89%
TOTALS	1767	2188	2451	988	45%

NUMBER OF COMPUTERS REPORTED IN USE IN CANADA INCREASES OVER 50% IN YEAR

The Computer Society of Canada issued recently its second annual census of computers installed or on order in their country. The report provides some interesting statistics on the use of computers by our northern neighbor.

One striking feature of the new census is that in the fifteen months since the publication of the previous census the number of computers reported as being installed in Canada increased by over 50%, from 538 reported on March 31, 1964, to 820 reported on June 30, 1965. Whether this increase is due to a booming market for computers in Canada or to more thorough coverage of existing computer installations by the survey team of the Computer Society of Canada is not clear.

The quantity of computers on order (reported as 69 systems) is artificially low due to the fact that many organizations in Canada did not wish to report their

plans for new computers for publication in the Computer Society of Canada report.

The report, called the Census of Computers in Canada, is a supplementary issue of the Quarterly Bulletin of the Computer Society of Canada, issued June 30, 1965. Among the information included in the report is:

(1) A table showing the number of computers by prime shift monthly rental, subdivided by industry (given below);
(2) A listing of computers by user, subdivided by computer model and location;
(3) A listing of computers by province and city, subdivided by user and computer model;
(4) An alphabetical listing of the names and addresses of computer users in Canada; and
(5) A listing of the numbers of computers by their manufacturer. (Given below).

A copy of the Census of Computers in Canada can be obtained for $2.00 each from: The Book Department, University of Toronto Press, University of Toronto, Toronto 5, Ontario.

DISTRIBUTION OF COMPUTERS INSTALLED IN CANADA BY MANUFACTURER

MANUFACTURER	NUMBER OF INSTALLED SYSTEMS	PERCENT OF TOTAL
IBM	494	60%
Univac	114	14%
Control Data (Including General Precision)	44	5%
NCR	44	5%
Burroughs	33	4%
Honeywell EDP	27	4%
Computing Devices of Canada	19	2%
Digital Equipment	13	2%
General Electric	10	1%
All Others	22	3%
TOTALS	820	100%

COMPUTERS INSTALLED (OR ON ORDER) IN CANADA AS OF JUNE 30, 1965

DISTRIBUTION BY INDUSTRY BY COMPUTER SIZE
(IN TERMS OF PRIME SHIFT RENT PER MONTH)

INSTALLED	UP TO $1999	$2000 to $4999	$5000 to $9999	$10,000 to $19,999	$20,000 to $49,999	OVER $50,000	TOTAL
MANUFACTURING	72	78	34	50	7		241
DISTRIBUTION	9	18	9	8			44
FINANCE (BANKS, TRUST COS., INSURANCE)	15	24	20	30	11		100
TRANSPORT & COMMUNICATION	7	27	12	14	2	1	63
UTILITIES	1	18	5	7	3		34
PETROLEUM	7	17	5	20	3		52
SERVICE BUREAU	8	36	4	13	5		66
INSTITUTIONS (UNIVERSITIES, SCHOOLS, HOSPITALS)	34	32	7	6	7	1	87
GOVERNMENTS	22	21	15	9	7	1	75
OTHERS	13	29	5	11			58
TOTAL INSTALLED	188	300	116	168	45	3	820
TOTAL ON ORDER	5	21	25	16	2		69
GRAND TOTAL	193	321	141	184	47	3	889

STOCK MARKET REPORT ON SELECTED EDP FIRMS

October 1, 1965 - October 15, 1965

	1965 High	1965 Low	2 Week Sales in 100's	2 Week High	2 Week Low	Last	2 Week Net Change	2 Week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	65	41 1/8	3429	65	56 3/8	63	+6 7/8	+12.25
American R & D	25 1/2	17 5/8	179	21 1/2	19 1/2	20 1/2	+ 3/4	+ 3.80
Burroughs	45 1/2	24 7/8	3665	45 1/2	40	44 1/4	+4 1/8	+10.28
Contol Data	64 1/4	30 1/4	3511	35 3/4	31 1/4	33 1/2	+1 3/4	+ 5.51
Dura Corp.	33 1/8	19 3/4	150	22 1/2	21 1/2	22 1/4	+ 1/2	+ 2.30
Electronic Associates	27	16 3/4	1871	25 1/4	20 3/8	23 7/8	+3	+14.37
General Dynamics	48 5/8	35	3301	48 5/8	44 5/8	47	+1 1/2	+ 3.30
General Electric	120 1/4	91	1686	119 1/2	115	115 3/8	-1 1/2	- 1.28
Honeywell	79 7/8	58 1/4	813	79 7/8	72 1/4	73 3/4	-1 1/4	- 1.67
IBM	520	404	506	520	506	517 3/4	+10 3/4	+ 2.12
Inter Tel. and Tel.	63 7/8	48 3/4	1655	59 5/8	54 1/4	59 1/4	+5 1/8	+ 9.47
Litton	118 7/8	74 5/8	642	118	110	116 7/8	+7 3/4	+ 7.10
Nat. Cash Register	91 3/4	73 3/4	653	78 1/4	73 3/4	75 7/8	+ 3/8	+ 0.50
RCA	49	31	7763	49	43 7/8	47 1/2	+3 3/8	+ 7.65
Raytheon	39 1/2	19	5637	39 1/2	30 1/2	39 3/8	+8 1/4	+26.51
SCM	51 5/8	16 1/4	9622	47 1/4	41 3/4	45 1/2	+4 3/8	+10.65
Singer	83 1/4	59	1376	73 7/8	66	71	+5	+ 7.58
Sperry Rand	16 3/4	11 1/8	9648	16 3/4	14 5/8	16 1/2	+1 1/2	+10.00
NYSE COMPUTER STOCK AVERAGE							+3.46	+ 7.25
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	405	24 3/8	20 7/8	21 7/8	+ 5/8	+ 2.94
Bunker-Ramo	11 1/4	5 7/8	418	7 1/4	6 1/2	7 1/8	+ 1/8	+ 1.79
Cal Comp	24	13	101	15 3/8	14	14 3/8	- 1/4	- 1.68
Clary	6 1/8	3 1/8	137	3 7/8	3 1/8	3 3/4	+ 5/8	+20.00
Computer Application	32 1/2	15 3/4	691	26 3/8	23	25 5/8	+2 1/2	+10.81
Computer Science	67 3/4	19 5/8	519	67 3/4	58	65 7/8	+6 1/8	+10.25
Milgo Elect.	12 5/8	8 1/4	112	9 7/8	8 5/8	9 5/8	+1 1/8	+13.24
Planning Research	39 7/8	12 1/8	986	39 7/8	27 1/8	29 1/8	+10 7/8	+38.50
Potter Instrument	11 3/8	6 5/8	419	11 3/8	9	10 7/8	+1 5/8	+17.57
AMEX STOCK AVERAGE							+2.60	+12.60

	1965 High Bid	1965 Low Bid	Oct. 15 Bid	Oct. 15 Asked	2 Weeks ago Bid
OVER-THE-COUNTER					
CEIR	14 1/4	7	13 3/4	14	11 7/8
Computer Usage	30 3/4	13 1/4	21	23	19 3/4
Computer Control	17 1/8	8	11 1/8	11 1/2	8 1/2
Digitronics	7 1/4	3 7/8	6 1/4	6 5/8	6 5/8
Management Assistance	59	29 1/4	53	54	47 3/4
Scientific Data	44 3/4	31 3/4	38 1/2	39	35

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SR 7492

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E|D|P
INDUSTRY AND MARKET REPORT
A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

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SPERRY RAND, IBM PATENT AGREEMENT APPEARS TO PAVE WAY FOR INTRODUCTION OF UNIVAC'S NEW PRODUCT LINE OF 360-COMPATIBLE COMPUTERS

Sperry Rand's recent patent agreement with IBM to cross-license on a non-exclusive basis all patents of the two firms in the computer and data processing field appears to pave the way for the introduction during late February/March '66 of Univac's new line of small-scale computer systems designed to be program compatible with IBM's System/360.

Prior to the recent agreement, Sperry Rand had been conducting negotiations with IBM in connection with several computer patents, including the famous ENIAC patent (No. 3,120,606) awarded to Sperry Rand in early '64. The ENIAC patent covers basic design principles used in the first electronic digital computer, the ENIAC (vintage 1946), and incorporated, according to claims by Sperry Rand's patent experts, into the design of most modern computers. Negotiations or litigation concerning this and other computer patents is still being conducted by Sperry Rand with or against over 20 other firms, including several major computer manufacturers. For example, Sperry's suit against Control Data for the alleged violation of four of SR's patents on random access memory devices has been in the courts for the last fifteen months.

Some industry observers have suggested that a firm gains little in a patent cross-license agreement with IBM for IBM is required to offer a patent license at a nominal sum under the 1956 consent decree. Actually the 1956 consent decree only required IBM to grant a non-exclusive royalty based license on its computer and data processing equipment patents issued on or before January 1,1961. At the same time firms requesting such a license must agree to grant IBM a license on a reasonable basis for any of the applicant's computer patents. Many of the pertinent patents covering System/360 technology were granted after January 1, 1961...and therefore are not controlled by the regulations of the '56 decree.

The new Univac computer line is expected to cover initially the low end of the computer price scale...concentrating in systems renting from $1000 to $10,000 per month. Besides being program compatible with System/360, the machines are expected to offer a read-only memory "emulator" for program compatibility with the Univac's 1050 and perhaps its Solid-States. The new line will offer a series of models with a price/performance competitive to IBM's 360/20, 360/30, and 360/40, Burroughs' B300 series, GE's 115, Honeywell's 120 and 200, NCR's 500 series, and RCA's 70/15, 70/25, and 70/35. The impact of the new series within Univac's existing product line will be to replace and/or upgrade punched card tabulator and calculator installations, and Univac 1004's, and 1050's. It will also effectively terminate the market life of Univac's recently announced but unpromoted 1005 computer.

E | D | P Industry and Market Report is published twice a month by the International Data Publishing Co., P. O. Box 1, Newtonville, Mass. 02160. Entire contents ©, 1965 by the International Data Corporation. Editorial contributions are gathered from numerous industry experts, and are researched and prepared by members of our editorial staff. The information and opinions contained in this issue are based on the best information available to us, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $49.50; Six Months, $29.

DEDICATION OF THE KEYDATA ON-LINE DATA PROCESSING SERVICE MAY MARK BEGINNING OF NEW GROWTH INDUSTRY...BUT WHEN WILL GROWTH BEGIN?

Keydata Corporation dedicated its Univac 491 based on-line commercial service bureau last month, labeling it as the first time-shared computer for business applications. The goal of the system is to provide up to 256 individual business firms on-line processing of invoices, inventory records, and other business transactions. Already 26 customers ranging from a $50 million-a-year wholesale liquor distributor (who is dumping its IBM 1440 and putting its data processing work on the Keydata's computer) to a $1 million-a-year clothing manufacturer have signed up for the system. Customers are going on-line one by one during a build-up of the system's processing load...with four to six expected to be serviced by the end of the year.

Keydata is a subsidiary of Charles W. Adams Associates, the highly regarded programming and consulting firm. Adams Associates have been extensively engaged in development and implementation of advanced techniques for on-line computing and man-machine communications. The Keydata service was first put into operation by the Adams Associates in July, 1963, with eight stations connected on-line to a Digital Equipment PDP-4 computer. This system was used for the acquisition and processing of data related to the settlement of some 40,000 complex legal claims in the Transitron stock snafu.

Design improvements and expansion of the executive routine (the master program that manages the operation of the on-line computer) were made during the last two years...evolving the software through two generations. Regular commercial service was planned for the Keydata by the Adams' people in early spring of this year, but unexpected performance difficulties with their computer at that time, a DEC PDP-6, caused delays. In a surprise move they returned their PDP-6 and took delivery of a Univac 491 computer at the end of July...the first 491 to be delivered since its formal announcement in June. Working closely with Univac, they had the service "on the air" in early October.

Who can benefit from an on-line data processing service? Clearly any firm which puts a high premium on immediate processing of inventory level requests, order entry, re-order issuance, credit checking, etc., may find the Keydata service beneficial. On such jobs the Keydata service gives a response measured in seconds versus a day or two for regular service bureau-type performance on a batch processing computer. The main consideration in assessing the value of the service is whether the saving in time can justify the premium charges involved in the on-line hookup.

Premium charges over and above regular service bureau transaction charges on the Keydata service are due to on-line storage rental and data communications terminal and line charges. For example, in a typical Keydata hook-up, on-line storage capacity rents for $200 per month, the teletype terminal rents for $160 per month, and the private wire connection to get the user hooked up to Keydata's computer costs between $1.33 and $2.25 per month per mile. For a typical user located 30 miles from Keydata's service bureau the premium charge amounts to about $420 per month, or say $20 each working day. For businesses where the shortening of the delivery cycle by a day or two can mean significant improvement in inventory cost or customer satisfaction, this premium charge may be easily outweighed by the value of the benefits.

As Keydata's service is currently set up, manufacturing and distribution firms with $3-$5 million in sales appear to be the most direct customer prospects. Since there are approximately 15,000 such firms in the United States, the potential market for such on-line data processing services should be considerably greater than supplier capacity for many years to come.

At the current time line charges restrict the distance from which a customer can economically use an on-line computer service bureau. Therefore most on-line service bureaus will service customers located within 50-100 miles of the computer's location. Keydata expects to open a second center in New York next year. Other on-line service bureaus are springing up in Atlanta, Dallas, San Francisco, and Washington.

The critical factor in achieving success for the Keydata system will be the ability of the programmers and systems analysts of the Adams Associates in controlling the sophisticated real-time processor and its executive routine in order to achieve satisfactory customer service while preventing data errors, loss of records, etc., when the number of users begins to approach peak loads. Since Keydata is renting their 491 configuration for $30,000/mo., it would seem that the system needs at least 50-60 active customers before a break-even point can be reached. However we feel it is unlikely that satisfactory service for more than 30-40 subscribers can be rendered on the Keydata system before '67...mostly due to programming complexities.

Both computer manufacturers as well as other service bureaus will be watching very closely the success of the Keydata system in the coming year. A highly successful operation should greatly accelerate acceptance of on-line service bureau activities. Adams Associates, by absorbing the expensive development costs in pioneering an on-line service bureau operation, is not likely to see profits from Keydata for several years, but it will be making an important contribution to the computer community...and in particular to Univac by showing it can be done on a Series 490 computer.

HONEYWELL ADJUSTS RENTAL AND PURCHASE POLICIES FOR ITS COMPUTERS TO ENCOURAGE PURCHASES AND LONG-TERM LEASING

One could have anticipated it from Honeywell's 3rd Qtr. financial report issued on September 30, 1965. It stated, "While sales increased 8% in the third quarter of this year over 1964, Honeywell experienced a 4% decline in profits for the period. Principal factors were lower earnings in the quarter from our International activities and the influence of leasing on computer income....In the last year there has been a somewhat greater bent toward rental than purchase (of computers). Rentals are now running about 90% of shipments. For the nine-month period the computer gain over last year in rental income is 75% with an 89% gain in the third quarter. In the longer view this could be very desirable. However, the lower percentage of outright sales has an adverse effect on current earnings. This percentage may alter as it is recognized that the industry with its new high performance families of computers is probably entering a period of less rapid change in the cost to performance ratio. The financial advantages of purchase under these conditions will be quite evident." (emphasis added)

On November 15, 1965, Honeywell's EDP Division made these advantages strikingly evident by introducing a new pricing policy on their Series 200 computers.

This is how the new program works:

For customers purchasing equipment:

(1) On outright purchase of equipment an average 7½% discount off list price is given.

(2) On purchase of equipment during the first year of installation, an average 5% discount off list price is given.

(3) A 100% purchase option credit on rentals applies during the first six months after installation.

(4) An 80% purchase option credit on rentals applies during the second six months after installation.

(5) A purchase option credit of 60% of rentals will apply after the first twelve months. (The 60% was normal for the previous policy.)

For customers renting equipment:

(1) On a five-year rental commitment Honeywell provides a 7½% reduction in rental. The user may change the configuration of his system during the rental period without penalty.

(2) On a four-year rental commitment Honeywell provides a 2½% reduction in rental.

(3) The three-year rental commitment retains at the regular rental rates.

(4) On one-year rental commitments a rental increase of 2½% is made. Processing time is increased in this rental arrangement from 176 to 200 hours per month.

In addition, maintenance charges were increased on most pieces of main frame and peripheral equipment. The maintenance hikes vary with individual pieces of equipment. The average increase is from 10% to 15%.

Honeywell is likely to find it has pioneered a multi-level pricing policy shortly to be "emulated" by several of its fellow IBM competitors. Burroughs and SDS already have rental reduction plans in effect for long-term leases on some of their equipment. Other firms are likely to follow suit shortly.

The effect of the new pricing plan is not likely to be known for six to nine months. A purchase decision on a piece of capital equipment as costly as a computer is usually made at the Board of Directors' level, so a four to eight month delay in purchase decisions can be expected. Therefore, the anticipated additional purchase income to Honeywell's EDP Division should result during the second and third quarter of 1966.

An important added benefit to Honeywell of its new pricing plan is that users with purchased computers or with long-term leases do not have the "replacement threat" that often allows a user to pressure for additional services or programming support. For computers in the low price range, such as Honeywell's 120

and 200, these additional support services can often greatly restrict what profits might be possible from small-scale computer installations.

In addition, concern has been expressed by many observers as to whether Honeywell H-200 series users view their computer as a long-term commitment, or whether they see it as an interim machine between IBM 1400 series equipment and the System/360. During the next six to nine months, Honeywell may well answer this criticism by the customer response to its new pricing policy. If a high percentage of customers are converted to purchase and long-term contracts, Honeywell can refute the critics handily. If few customers expand their commitment past the one-year contract, the chorus of skeptics will be loud indeed.

Incidentally, Honeywell is shooting for the Number Two spot in the industry in terms of the value of new systems shipped during '65. They expect to have some 800 computers installed in the United States by the end of this month, with a total installed value of $400 million. This will represent shipments of approximately $180 million during this year. At this level they may well have outpaced Univac and Control Data for the second-to-IBM-in-new-shipments title.

WHAT THE INDUSTRY IS TALKING ABOUT...

Burroughs: Image greatly sharpened in the super-scale computer area by winning contract for B8500 system from U. S. Steel. Value of contract may run from $5 to $15 million depending on final system configuration. Award was won against competition from Control Data's 6600/6800, GE's 635/645, IBM's 360/90, 92, and Univac's 1109. When installed by the end of '66, the B8500 will replace 16 currently installed competitive computers including 13 from IBM....five 1401's, three 1460's, four 7010's, and a 7074.

IBM: ITT-ABC merger sparks rumors that IBM-CBS will be next. Would seem to be in line with IBM's plans to increase its participation in service industries with a heavy educational orientation. However, IBM discussions with CBS officials at this time probably due to IBM's first use of television commercials for computers and office products this coming season.

System/360 deliveries pushed back as much as nine months even for prime accounts. Many customers very unhappy with delay, but in most cases lead time to reconsider equipment selection and system implementation too long to allow for switch to competitive system. However, some government users and government-contractors who need their computing capacity on schedule to fulfill existing project commitments are switching.

GE: MAC people estimate cost of operating system being developed for the GE 645 time-sharing computer is in excess of $2 million. DOD's Advanced Research Projects Agency and Bell Labs are carrying most of the cost. GE gets good share of the benefit. Complexity of programming for 635/645 time-sharing system has delayed deliveries by six months to a year over '64 expectations.

Univac: Capturing United Air Lines' anxiously anticipated award of a $39 million contract for an integrated reservation and management information system based on three 1108 computers gives big boost to Univac's sales force. Univac's star salesman, Lee Johnson, who also heads government sales, managed Univac's bidding on the contract...the largest commercial EDP award to date. Univac got lead on award by being able to demonstrate working equipment (system is to be delivered beginning in 1967) and by success of 490 system in airline reservations systems for Eastern, Northwest Orient, BEA, etc. Univac now has its sights set on winning reservation systems being bid for at TWA and Air France.

MONTHLY COMPUTER CENSUS

The number of electronic digital computers installed or in production at any one time has been increasing at a bewildering pace in the past several years. New vendors Have come into the market, and familiar machines have gone out of production. Some machines have been received with open arms by users -- others have been given the cold shoulder.

To aid readers of the EDP I&MR in keeping with this mushrooming activity, we compile and publish this monthly report on the number of general purpose electronic computers made by American-based companies which are installed or on order as of the preceding month. These figures included installations and orders outside the United States. We update this computer census monthly, so that it will serve as a "box score" of progress in following the growth of the American computer industry, and of the computing power it builds.

In general, manufacturers in the computer field do not officially release installation and on order figures. The figures in this table are developed through a continuing market survey conducted by our research staff. This market research program develops a documented data file on over 80% of the computer installations in the United States. A similar program is conducted for overseas installations.

Comments on this census from informed readers will be welcomed.

AS OF NOVEMBER 10, 1965

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Advanced Scientific Instruments	ASI 210	Y	$2850	4/62	24	1
	ASI 2100	Y	$3000	12/63	6	1
	ADVANCE 6020	Y	$2200	4/65	5	4
	ADVANCE 6040	Y	$2800	7/65	1	7
	ADVANCE 6050	Y	$5000	10/65	0	3
	ADVANCE 6070	Y	$10,500	10/65	1	6
	ADVANCE 6080	Y	$7000	1/66	0	0
Autonetics	RECOMP II	Y	$2495	11/58	49	X
	RECOMP III	Y	$1495	6/61	11	X
Bunker-Ramo Corporation	BR-130	Y	$2000	10/61	158	6
	BR-133	Y	$2400	5/64	8	7
	BR-230	Y	$2680	8/63	15	X
	BR-300	Y	$3000	3/59	38	X
	BR-330	Y	$4000	12/60	34	X
	BR-340	Y	$7000	12/63	20	X
	BR-530	Y	$6000	8/61	14	X
Burroughs	205	N	$4600	1/54	53	X
	220	N	$14,000	10/58	44	X
	E101-103	N	$875	1/56	155	X
	B100	Y	$2800	8/64	90	28
	B250	Y	$4200	11/61	106	5
	B260	Y	$3750	11/62	235	25
	B270	Y	$7000	7/62	155	15
	B280	Y	$6500	7/62	94	18
	B300	Y	$8400	7/65	22	75
	B5000/B5500	Y	$20,000	3/63	46	9
	B8500	Y	$200,000	2/67	0	1
Computer Control Co.	DDP-19	Y	$2800	6/01	3	X
	DDP-24	Y	$2500	5/63	68	8
	DDP-116	Y	$900	4/65	30	40
	DDP-124	Y	$2050	2/66	0	4
	DDP-224	Y	$3300	3/65	13	15
Clary	DE-60/DE-60M	Y	$525	7/60	344	4
Control Data Corporation	G-15	N	$1000	7/55	326	X
	G-20	Y	$15,500	4/61	21	X
	160*/160A/160G	Y	$1750/$3400/$12,000	5/60;7/61;3/64	439	1
	924/924A	Y	$11,000	8/61	29	X
	1604/1604A	Y	$38,000	1/60	60	X
	1700	Y	$2200	5/66	0	18
	3100	Y	$7350	12/64	37	36
	3200	Y	$12,000	5/64	87	18
	3300	Y	$15,000	9/65	4	60
	3400	Y	$25,000	11/64	20	22
	3500	Y	$30,000	6/66	0	3
	3600	Y	$58.000	6/63	46	10
	3800	Y	$60,000	11/65	0	18
	6400	Y	$40,000	1/66	0	8
	6600	Y	$110,000	8/64	7	9
	6800	Y	$140,000	4/67	0	4
Digital Equipment Corporation	PDP-1	Y	$3400	11/60	60	2
	PDP-4	Y	$1700	8/62	55	2
	PDP-5	Y	$900	9/63	112	3
	PDP-6	Y	$10,000	10/64	9	6
	PDP-7	Y	$1300	11/64	32	44
	PDP-8	Y	$525	4/65	75	302
El-tronics, Inc.	ALWAC III E	N	$1820	2/54	21	X
Electronic Associates, Inc.	8400	Y	$7000	6/65	2	6
Friden	6010	Y	$600	6/63	289	180
General Electric	115	Y	$1375	12/65	0	400
	205	Y	$2900	6/64	40	12
	210	Y	$16,000	7/59	54	X
	215	Y	$6000	9/63	53	3
	225	Y	$8000	4/61	140	2
	235	Y	$10,900	4/64	58	8
	415	Y	$7300	5/64	80	65
	425	Y	$9600	6/64	42	52
	435	Y	$14,000	10/64	19	24
	625	Y	$41,000	12/64	8	16
	635	Y	$45,000	12/64	3	21
General Precision	LGP-21	Y	$725	12/62	100	X
	LGP-30	Semi	$1300	9/56	305	X
	RPC-4000	Y	$1875	1/61	65	X
Honeywell Electronic Data Processing	H-120	Y	$2600	12/65	0	190
	H-200	Y	$5700	3/64	670	210
	H-400	Y	$8500	12/61	175	5
	H-800	Y	$22,000	12/60	31	4
	H-1200	Y	$6500	2/66	0	40
	H-1400	Y	$14,000	1/64	12	2

NAME OF MANUFACTURER	NAME OF COMPUTER	SOLID STATE?	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS	NUMBER OF UNFILLED ORDERS
Honeywell (Cont'd.)	H-1800	Y	$30,000	1/64	14	6
	H-2200	Y	$11,000	11/65	0	48
	H-4200	Y	$16,800	2/66	0	8
	H-8200	Y	$35,000	3/67	0	1
	DATAmatic 1000	N	$40,000	12/57	4	X
IBM	305	N	$3600	12/57	172	X
	360/20	Y	$1800	12/65	0	3700
	360/30	Y	$7200	5/65	300	3100
	360/40	Y	$14,500	4/65	250	850
	360/44	Y	$12,000	9/66	0	350
	360/50	Y	$28.000	8/65	7	360
	360/60	Y	$38.000	11/65	0	12
	360/62	Y	$55,000	11/65	0	5
	360/65	Y	$46,000	1/66	0	110
	360/67	Y	$49,000	9/66	0	22
	360/75	Y	$78,000	11/65	0	78
	650	N	$4800	11/54	255	X
	1130	Y	$850	11/65	0	1500
	1401	Y	$4500	9/60	6800	220
	1401-G	Y	$2000	5/64	1150	750
	1410	Y	$14,200	11/61	740	35
	1440	Y	$3300	4/63	2450	300
	1460	Y	$9000	10/63	2100	250
	1620 I, II	Y	$2500	9/60	1700	20
	1800	Y	$3700	12/65	0	115
	701	N	$5000	4/53	1	X
	7010	Y	$22,600	10/63	160	40
	702	N	$6900	2/55	8	X
	7030	Y	$160,000	5/61	7	X
	704	N	$32,000	12/55	41	X
	7040	Y	$18,000	6/63	112	8
	7044	Y	$35,200	6/63	75	18
	705	N	$30,000	11/55	61	X
	7070, 2, 4	Y	$27,000	3/60	342	7
	7080	Y	$55,000	8/61	75	X
	709	N	$40,000	8/58	11	X
	7090	Y	$63,500	11/59	46	1
	7094	Y	$72,500	9/62	135	8
	7094 II	Y	$78,500	4/64	90	30
ITT	7300 ADX	Y	$18,000	9/61	9	6
Monroe Calculating Machine Co.	Monrobot IX	N	Sold only- $5800	3/58	150	X
	Monrobot XI	Y	$700	12/60	580	120
National Cash Register Co.	NCR-304	Y	$14,000	1/60	26	X
	NCR-310	Y	$2000	5/61	45	X
	NCR-315	Y	$8500	5/62	390	50
	NCR-315-RMC	Y	$12,000	9/65	10	40
	NCR-390	Y	$1850	5/61	1075	45
	NCR-500	Y	$1500	10/65	15	560
Philco	1000	Y	$7010	6/63	20	0
	2000-210,211	Y	$40,000	10/58	18	1
	2000-212	Y	$52,000	1/63	9	1
	2000-213	Y	$68,000	9/66	0	1
Radio Corporation of America	Bizmac	N	$100,000	-/56	3	X
	RCA-301	Y	$6000	2/61	620	7
	RCA-3301	Y	$11,500	7/64	44	18
	RCA-501	Y	$14,000	6/59	99	2
	RCA-601	Y	$35,000	11/62	5	X
	Spectra 70/15	Y	$2600	11/65	0	80
	Spectra 70/25	Y	$5000	11/65	0	70
	Spectra 70/35	Y	$7000	4/66	0	16
	Spectra 70/45	Y	$9000	3/66	0	80
	Spectra 70/55	Y	$14,000	5/66	0	22
Raytheon	250	Y	$1200	12/60	75	5
	440	Y	$3500	3/64	13	4
	520	Y	$3200	10/65	1	5
Scientific Data Systems, Inc.	SDS-92	Y	$900	4/65	25	40
	SDS-910	Y	$2000	8/62	150	18
	SDS-920	Y	$2700	9/62	96	13
	SDS-925	Y	$2500	12/64	11	28
	SDS-930	Y	$400	6/64	73	30
	SDS-9300	Y	$7000	11/64	17	8
Systems Engineering Labs	SEL-810	Y	$750	9/65	2	12
	SEL-840	Y	$4000	11/65	0	3
UNIVAC	I & II	N	$25,000	3/51 & 11/57	29	X
	III	Y	$20,000	8/62	89	1
	File Computers	N	$15,000	8/56	19	X
	Solid State 80 I, II, 90 I, II & Step	Y	$8000	8/58	295	20
	418	Y	$11,000	6/63	50	30
	490 Series	Y	$26,000	12/61	75	51
	1004	Y	$1900	2/63	3150	200
	1005	Y	$2400	2/66	0	80
	1050	Y	$8000	9/63	245	125
	1100 Series (except 1107)	N	$35,000	12/50	12	X
	1107	Y	$45,000	10/62	29	1
	1108	Y	$50,000	9/65	3	19
	LARC	Y	$135,000	5/61	2	X
				TOTALS	30,104	15,909

X = no longer in production

* To avoid double counting, note that the Control Data 160 serves as the central processor or the NCR 310. Also, many of the orders for the IBM 7044, 7074, and 7094 I and II's are not for new machines but for conversions from existing 7040, 7070 and 7090 computers respectively.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

October 15, 1965 - December 10, 1965

	1965 High	1965 Low	8 Weeks Sales in 100s	8 Weeks High	8 Weeks Low	Last	8 Weeks Net Change	8 Weeks % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	65 1/4	41 1/8	6643	65 1/4	58 1/2	63 1/4	+ 5/8	+ 0.99
American R & D	25 1/2	17 5/8	887	23 1/4	18 3/4	23	+ 2 5/8	+12.80
Ampex Corp.	28 3/8	13 3/8	28842	28 3/8	21 5/8	28	+ 4 1/8	+17.28
Burroughs	48 1/4	24 7/8	8944	48 1/4	40	47 1/2	+ 3 1/4	+ 7.34
Control Data	64 1/4	30 1/4	22214	44 7/8	32 1/2	38 1/4	+ 4 3/4	+14.18
Dura Corp.	33 1/8	19 3/4	707	25 1/4	20 1/2	25 1/4	+ 3 1/4	+14.61
Electronic Associates	32 3/8	16 3/4	8306	32 3/8	22 1/4	28 3/4	+ 4 7/8	+20.42
General Dynamics	62 7/8	35	15115	62 7/8	46 5/8	61 1/2	+14 3/4	+31.38
General Electric	120 1/4	91	5166	118 7/8	112	113	- 1 5/8	- 1.41
Honeywell	79 7/8	58 1/4	3657	77 1/2	67 1/2	74 3/4	+ 1 3/8	+ 1.86
IBM	549	404	2367	549	494 1/4	518	+ 1 3/4	+ 0.34
Inter Tel. & Tel.	67 5/8	48 3/4	5843	67 5/8	59 7/8	65 7/8	+ 6 5/8	+11.18
Litton	141 1/4	74 5/8	4113	141 1/4	113 1/2	140 1/2	+23 5/8	+20.21
Nat. Cash Register	91 3/4	69	3454	81 3/4	69	78 3/4	+ 6 1/2	+ 8.57
RCA	50 1/2	31	18214	50 1/2	44 1/4	47 1/4	- 1/4	- 0.53
Raytheon	46	19	13581	46	36 3/8	41 1/8	+ 1 3/4	+ 4.44
SCM	61 5/8	16 1/4	35105	61 5/8	42 1/2	58 7/8	+13 3/8	+29.39
Singer	83 1/4	56	5746	71 3/8	56	60 1/2	- 9 7/8	-13.91
Sperry Rand	21 7/8	11 1/8	44070	21 7/8	15 7/8	21 3/8	+ 4 7/8	+29.54
NYSE COMPUTER STOCK AVERAGE							+ 4.55	+10.98
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	1711	26 7/8	20	25 1/2	+ 3 5/8	+16.57
Bunker-Ramo	11 1/4	5 7/8	4274	10 3/8	6 3/4	9 3/8	+ 2 1/4	+31.58
Cal Comp	24	13	672	18 3/8	14	16 5/8	+ 2 1/4	+15.65
Clary	6 1/8	3 1/8	1359	6	3 1/2	5 1/4	+ 1 1/2	+40.00
Computer Application	32 1/4	15 3/4	1264	26 3/8	19 5/8	21 7/8	- 3 3/4	-14.63
Computer Science	27 3/8	20 3/4	2539	26 5/8	20 3/4	22	- 4 3/8	-16.51
Milgo Elec.	12 5/8	6 5/8	560	9 1/2	6 5/8	8 1/4	- 1 3/8	-14.28
Planning Research	39 7/8	12 1/8	1168	38 7/8	30 1/4	33	- 6 1/8	-15.65
Potter Instrument	18 1/2	6 5/8	2075	18 1/2	10 1/8	17 5/8	+ 6 3/4	+62.07
AMEX COMPUTER STOCK AVERAGE							+ .08	+11.64

	1965 High Bid	1965 Low Bid	Dec. 10 Bid	Dec. 10 Asked	8 Weeks ago Bid
OVER-THE-COUNTER					
CEIR	14 1/4	7	13 1/8	13 3/8	13 3/4
Computer Usage	30 3/4	13 1/4	10 1/4	18	21
Computer Control	17 1/8	8	14 1/2	15	11 1/8
Digitronics	8 1/8	3 7/8	7	7 1/2	6 1/4
Management Assistance	31	27	28 3/4	29 1/2	53
Scientific Data	44 3/4	31 3/4	41 3/4	42 1/4	38 1/2

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January 15, 1966 Vol. 1., No. 24

SPECIAL FEATURE THIS ISSUE:
The American Computer Industry 1955-1975....Page 3

E|D|P
INDUSTRY AND MARKET REPORT

A SEMI-MONTHLY NEWSLETTER FOR EXECUTIVES IN THE ELECTRONIC DATA PROCESSING INDUSTRY, AND THE FINANCIAL COMMUNITY.

P. J. McGovern, Editor
Telephone 617-332-8840

GROSS VALUE OF AMERICAN COMPUTER SHIPMENTS DURING '65 REACHES RECORD $2.3 BILLION; SHIPMENTS EXPECTED TO INCREASE 30% TO $3.0 BILLION DURING '66

The gross sales value of computers and related peripheral equipment shipped by American manufacturers during 1965 reached $2.3 billion, according to year-end figures compiled by our research staff. Although this is a record high, it represents a relatively modest 4.5% increase over the $2.2 billion shipped during 1964. The percentage breakdown by manufacturer of these '65 computer shipments is:

MANUFACTURER	GROSS VALUE OF SHIPMENTS IN $ MILLIONS (Estimate)	PERCENTAGE OF TOTAL (Estimate)
IBM	$1,472 - $1,495	64-65%
UNIVAC	173 - 185	7.5-8.0%
Honeywell	173 - 185	7.5-8.0%
Control Data	150 - 161	6.5-7.0%
General Electric	81 - 92	3.5-4.0%
NCR	74 - 78	3.2-3.4%
Burroughs	60 - 64	2.6-2.8%
RCA	41 - 46	1.8-2.0%
Others	29 - 39	1.3-1.7%
TOTAL		100%

The above figures are our estimates of the gross sales value for general-purpose digital computers shipped by the listed manufacturers and their subsidiaries to all countries during 1965. They include peripheral equipment and memory units shipped during the year to expand existing installations.

'65 proved an excellent year for Honeywell EDP shipments, with the company finishing neck-and-neck with UNIVAC for the "Number Two" spot in the industry by the measure of annual shipments. IBM's share of annual shipments was 10-12% below its current market share. The drop was due to reduced production levels on 1400 and 7000 series equipment as IBM tooled up for volume production on 360 units. '65 deliveries of 360 units were 200 less than the 1000 level predicted by IBM at its last annual meeting. Control Data's shipment level equalled its annual sales for its last fiscal year...but since just over half of the systems were shipped on leases, the firm is currently burdened with a heavy share of postponed and, to some extent, uncertain income.

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'66 we've christened the "Year of the Rolling Circle." It's the year when volume deliveries of IBM's "circle system," the 360, get underway. This, coupled with heavy shipments of other third-generation computer series such as RCA's Spectra 70 and Honeywell's 200 series, should push the value of computer shipments during '66 to $3.0 billion, a 30% increase over '65.

January is the month when business writers become infected with "prediction-itis." We find we are not immune to this malady. It leads us to offer the forecast that the "Year of the Rolling Circle" will prove to be:

(1) The year that confirms that a firm doesn't have to have the most advanced computers in order to capture a profitable share of the EDP market. The highly unsaturated nature of the market for small- and medium-scale computers, as well as the conservative approach to EDP taken by many managements in small- and medium-sized firms, will provide a strong demand for second-generation computer systems with proven software. Burroughs, Honeywell, IBM, NCR, and UNIVAC should benefit particularly from this situation.

(2) The year in which strategic delays in shipping dates for 360 systems enable IBM to maintain its profit margin while undergoing the heaviest production, marketing, and support expenses in its history.

(3) The year in which the performance and payoff obtained from the super-scale computer demonstrates that the industry hasn't matured much beyond the STRETCH stage. Machines such as Control Data's 6000 series, larger members of GE's 600 series, and IBM's 360/90 series can be expected to continue to experience performance headaches due to the complexity of their logic organization and to the shortage of sophisticated system analysis and programming talent needed to realize the full potential of such equipment.

Our expectations of activity involving the leading EDP manufacturers during '66 include:

Burroughs will introduce a new series of computer systems (internally called the B-2000 series) in March. It will be the firm's third-generation offering in the small- and medium-class computer area. We expect it will feature integrated circuitry and 360 program compatibility.

Control Data will find that IBM can be paternalistic. We expect White Plains to lessen considerably the competitive pressure in the super-scale computer market to permit Control Data to improve its current financial condition. IBM is sensitive to the anti-trust investigation that might follow if Control Data were to lose an appreciable part of its current share of the computer market. Control Data, realizing this, is expected to intensify its current howl about how its "major competitor in the very large computer part of the market is making a highly concentrated effort to hinder our progress..." (Quote from statement by President W.C. Norris in CDC's 1965 Annual Report).

General Electric will introduce smaller members of the 600 series (the 605? and 615?) and will step up its drive to obtain centralized management information system orders for multi-computer installations from prestige accounts.

Honeywell will realign its computer marketing effort along industry lines, emphasizing sales to manufacturing, financial, and insurance firms, and service bureaus. This will allow its software support investment to be concentrated in specific application packages for these fields.

IBM will introduce a baby brother to the Model 360/20 aimed at replacing, in measured steps, punched card tabulators and calculators, Possibly called the Model 10, the system would have a restricted memory capacity, use a Multi-Function Card Machine similar to that offered with the 360/20, and rent in the $700-$1,000 a month range.

NCR will find that its 500 series continues its popularity with banks and with businesses with $5 to $25 million in annual sales.

RCA EDP Division will continue its slow and measured growth under a corporate restriction of "no loss" operations.

Scientific Data Systems will introduce a new series of computers designed for the small- and medium-scale computer market. The new systems will offer software for both business and scientific applications. '66 is also the year that SDS becomes a factor to consider in the general-purpose computer business, upgrading the "Big 8" reference to the "Big 9."

UNIVAC introduces the first three models of a new product line of small- and medium-scale computer systems (see December 15 issue). The firm also continues to capitalize on its lead in the real-time systems market, yielding substantial order levels for the 490 series, the 418, and the 1108.

A Special Research Report
A HISTORY AND PROJECTION OF THE ANNUAL SIZE OF MAJOR SECTORS OF THE COMPUTER INDUSTRY

We recently completed an intensive computer industry study to measure the past, current, and expected annual sizes of the five principal sectors of the computer industry. These five principal sectors are defined below along with a selection of firms participating in them:

I. General Purpose Digital Computers

Includes leading manufacturers of internally programmed, general-purpose digital computers used in a variety of business and/or scientific-engineering applications.

Burroughs Corp.	NCR
Control Data Corp.	RCA
General Electric	Scientific Data Systems
Honeywell	Sperry Rand
IBM	

II. Special Purpose System Computers (Analog and Digital)

Includes leading manufacturers of analog and digital computers generally used in special-purpose systems. Analog computers are included in this category because their use is usually concentrated in specific problem areas, e.g. simulation of dynamic systems.

Adage	Bunker-Ramo
Advanced Scientific Instruments	Collins Radio
Applied Dynamics	Computer Control
Astrodata	Computer Products
Beckman Instruments	Conductron

Data Machines
Digital Equipment
Electronic Associates
Foxboro
Milgo Electronic
Raytheon
Reeves Instrument
System Engineering Labs
Teledyne

III. Peripheral Equipment

Includes leading manufacturers of peripheral equipment used with computers. Examples are paper tape handling equipment, magnetic tape transports, mass storage units, high-speed printers, graphic displays, data transmission units, etc. Core memories are also included in this category.

Addressograph-Multigraph
American Tel. & Tel.
Ampex
ANelex
Benson-Lehner
Bryant Computer Products
California Computer Products
Calma Corporation
Consolidated Electrodynamics
Cybetronics
Data Disk
Data Equipment
Data Products
Datamec
Digitronics
Electronic Memories
Fabri-Tek
Ferroxcube
Friden (Singer Co.)
General Precision
Gianinni Controls
Hewlett-Packard
Indiana General
Information Displays
Litton Industries
Lockheed Electronics
Midwestern Instruments
Mohawk Data Services
Olivetti Underwood
Potter Instrument
Rheem Electronics
Royal Typewriter
Sanders Associates
SCM
Stromberg-Carlson
Systron-Donner
Teletype
Tally Corp.
UGC Instruments
Uptime Corp.

IV. Programming Specialists, Service Bureaus, and Consulting Services

Includes firms supplying programming services or software to computer manufacturers and users, and firms supplying computer services on a contract or service bureau basis. Also includes firms offering consulting services in the selection, implementation and/or use of computers and data processing equipment.

Aries Corp.
Auerbach Corp.
Automatic Data Processing
Arthur Anderson
Applied Data Research
Bolt, Beranek and Newman
Booz, Allen & Hamilton
Brandon Applied Systems
C-E-I-R
Charles Adams Associates
Computer Applications
Computer Sciences
Computer Usage
Comress
Diebold Group
Digitek
Informatics
Mesa Scientific
Planning Research
System Development Corp.
URS Corp.

V. Data Processing Supplies and Supporting Services

Includes firms selling expendable data processing supplies such as paper tape, punched cards, magnetic tape, business forms, etc. Also includes related supporting activities conducted by personnel services, magazine and textbook publishers, leasing firms, etc.

Audio Devices	Management Assistance
Business Supplies Corp.	Memorex
Computron	3M
Cyber-Tronics	Moore Business Forms
DPA, Inc.	Standard Register
Forms, Inc.	Uarco
Mac Panel	

Table I provides our estimates of the annual market sizes for these five principal sectors between 1955 and 1965. Table II presents our projections of the annual market sizes of these market areas between 1966 and 1975. Table III provides a breakdown of the number of computer systems shipped by year from 1955 to 1965, and the expected number of systems to be shipped between 1966 and 1975. Table III also presents the estimated annual value of overseas sales by American computer manufacturers from 1955 to 1965, with projections to 1975.

TABLE I — ESTIMATED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS, AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET
(Size given in $Millions; Equipment Value calculated as Purchase Price of Systems Shipped)

Year	General Purpose Digital Computers	Special Purpose System Computers	Independent* Peripheral Equipment	Software, Service Bureaus, Consultants	Supplies and Supporting Services	Total
1955	$ 75	$ 80	$14	$ 15	$155	$ 339
1956	140	210	25	20	175	570
1957	240	350	35	25	195	845
1958	460	450	50	40	230	1230
1959	600	650	75	90	270	1685
1960	720	900	105	125	375	2225
1961	1100	1100	110	180	500	2990
1962	1400	1300	130	220	550	3600
1963	1800	1300	145	270	630	4145
1964	2200	1200	170	320	680	4570
1965	2300	1250	175	425	730	4880

*Since most of this equipment is sold to computer manufacturers, its value is included in the customer shipments of computer manufacturers.

TABLE II PROJECTED ANNUAL VALUE OF COMPUTER EQUIPMENT SHIPPED BY AMERICAN MANUFACTURERS, AND THE ANNUAL SIZE OF THE RELATED PERIPHERAL EQUIPMENT, SOFTWARE, AND SERVICES MARKET
(Size given in $Millions; Equipment Value calculated as Purchase Price of Systems Shipped)

Year	General Purpose Digital Computers	Special Purpose System Computers	Independent Peripheral Equipment	Software Service Bureaus, Consultants	Supplies and Supporting Services	Total
1966	$2900-3100	$1300-1400	$180-190	$480-500	$ 820-850	$ 5680-6040
1967	3700-4000	1400-1500	190-210	525-550	930-980	6745-7240
1968	3800-4200	1600-1800	200-220	560-590	1050-1150	7210-7960
1970	4500-5500	1800-2200	330-370	650-690	1100-1300	8380-10,060
1975	($9000-10,000)		900-1100	850-1000	1200-1500	11,920-13,600

+The distinction between general and special-purpose equipment is expected to be thoroughly lost by 1975 when low-cost processor fabrication techniques will make miniature special processors readily available on an interchangable basis for general-purpose computers.

Among the developments suggested by the figures in these tables are:

1. The value of general purpose digital computers shipped during the next five years will grow at an average compounded growth rate of 15-17%.

2. The distinction between general purpose and special purpose equipment is expected to disappear by 1975 when batch fabrication techniques will make miniaturized special processors readily available on an interchangeable basis for general purpose computers. For example, applications such as payroll, inventory control, sales analysis, etc., may each be run through separate logic circuitry in the central processor. Each section of the processor will contain specific logic circuitry to facilitate the running of particular applications.

3. The growth rate of the market for independent peripheral equipment will greatly accelerate starting at the end of this decade. This will be due to the opening up of direct user sales of low cost peripheral devices such as data collection equipment, display terminals, data communications equipment, etc.

4. Software consultants and service bureaus will experience a dampened growth rate during the last years of this decade due to (a) the availability of large amounts of rentable excess machine capacity at users with a single fee rental arrangement from their system supplier and (b) the heavy investments that computer manufacturers are putting into application packages will lessen the user's dependence upon outside programming support.

TABLE III ESTIMATED NUMBER OF UNITS AND VALUE OF YEARLY SHIPMENTS OF GENERAL-PURPOSE DIGITAL COMPUTERS MADE BY AMERICAN MANUFACTURERS (1955-1975)

(Value in $Millions; Equipment Value calculated as Purchase Price of Systems Shipped)

Year	No. of Systems Shipped	Total Value of Systems Shipped	Value of Foreign Shipments By American Companies*
1955	150	$ 75	
1956	600	140	
1957	1000	240	$ 40
1958	1400	460	60
1959	1700	600	130
1960	2200	720	185
1961	3000	1100	290
1962	3500	1400	330
1963	4500	1800	400
1964	5500	2200	520
1965	6000	2300	580-620
1966	7000-8000	2900-3100	825-875
1967	9000-11,000	3700-4000	1150-1250
1968	10,000-12,000	3800-4200	1300-1500
1970	13,000-15,000	4500-5500	1800-2200
1975	18,000-22,000	9000-10,000+	3000-3500

*Included in total value of systems shipped. +This figure includes special purpose systems.

5. The supplies and services market will maintain its current growth rate until the end of this decade, but will experience a considerably lessened growth rate during the first half of the 1970's due to the development of low cost data input and data collection terminals which will reduce the amount of data that needs to be prepared on punched cards or paper tape. Also, the development of selected read-out stations such as display devices and non-impact printers will reduce the requirement for paper forms for the presentation of files of data, memory dumps, intermediate results, etc.

STOCK MARKET REPORT ON SELECTED EDP FIRMS

December 10, 1965 - January 14, 1966

	1965-66 High	1965-66 Low	5 Weeks Sales in 100's	5 Weeks High	5 Weeks Low	Last	5 Week Net Change	5 Week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	67	41 1/8	3326	67	55 3/4	58 1/8	-5 1/8	- 8.10
American R & D	25 1/2	17 5/8	638	24 1/8	19 5/8	23 5/8	+ 7/8	+ 3.80
Ampex Corp.	28 7/8	13 3/8	11139	28 7/8	23 5/8	25	-3	-10.71
Burroughs	54 3/4	24 7/8	6470	54 3/4	45 7/8	53	+5 3/4	+12.11
Control Data	64 1/4	30 1/4	13822	40 7/8	32 1/4	32 3/4	-5 1/2	-14.38
Dura Corp.	33 1/8	19 3/4	489	28 1/8	25	27 3/4	+2 1/2	+ 9.90
Electronic Associates	32 3/8	16 3/4	3745	31 1/4	22 5/8	24 1/4	-3 7/8	-13.48
General Dynamics	68 1/4	35	11153	68 1/4	53 1/2	57 3/4	-3 3/4	- 6.10
General Electric	120 1/4	91	3824	120	112	117 1/8	+4 1/8	+ 3.65
Honeywell	79 7/8	58 1/4	1966	76 1/2	69 1/4	72	-2 3/4	- 3.68
IBM	549	404	1812	519	492	496	-22	- 4.25
Inter Tel. & Tel.	73 1/2	48 3/4	3364	73 1/2	64 1/2	70 3/4	+5 1/4	+ 7.97
Litton	150 1/2	74 5/8	1980	150 1/2	131	139 1/2	-1	- 0.01
Nat. Cash Register	91 3/4	69	1775	81 3/4	75 5/8	80 5/8	+2 1/2	+ 3.17
RCA	53	31	12413	53	44	52 1/2	+5 1/2	+11.64
Raytheon	46	19	5522	44 7/8	36 3/4	39 1/2	-1 3/8	- 3.34
SCM	62 5/8	16 1/4	11439	62 5/8	47 1/4	48 3/4	-8 1/2	-14.44
Singer	83 1/4	56	3716	64 3/4	56 5/8	63 1/2	+3	+ 4.96
Sperry Rand	24	11 1/8	104438	24	20 1/8	21 3/8	------	-------
NYSE COMPUTER STOCK AVERAGE							-1.44	- 1.12
AMERICAN STOCK EXCHANGE								
ANelex	39	19 3/4	710	27 3/4	22 1/4	24 5/8	- 7/8	- 3.43
Bunker-Ramo	11 3/8	5 7/8	4415	11 3/8	7 1/2	7 3/4	-1 5/8	-17.33
Cal Comp	24	13	308	17 3/8	15 1/8	15 5/8	-1	- 6.02
Clary	6 1/8	3 1/8	607	5 7/8	4 7/8	5 3/8	+ 1/8	+ 2.38
Computer Application	32 1/4	15 3/4	845	26 5/8	22	23 7/8	+2	+ 9.14
Computer Science	27 3/8	19 1/8	1017	23 5/8	19 1/8	20 3/4	-1 1/4	- 5.68
Milgo Elec.	12 5/8	6 5/8	268	10	7 1/8	8 1/4	------	------
Planning Research	39 7/8	12 1/8	799	37 1/2	31 3/4	33 1/8	+ 1/8	+ 0.38
Potter Instrument	18 1/2	6 5/8	517	18	14 5/8	17 7/8	+ 1/4	+ 1.42
AMEX COMPUTER STOCK AVERAGE							-0.25	- 2.21

	1965-66 High Bid	1965-66 Low Bid	Jan. 14 Bid	Jan. 14 Asked	5 Weeks ago Bid
OVER-THE-COUNTER					
CEIR	15 1/4	7	15	15 1/4	13 1/8
Computer Usage	30 3/4	13 1/4	22 1/2	24 1/8	16 1/4
Computer Control	18 1/4	8	17 3/8	17 3/4	14 1/2
Digitronics	10 1/2	3 7/8	10 1/2	10 7/8	7
Management Assistance	39 1/2	27	36	36 3/4	28 3/4
Scientific Data	50	31 3/4	49 3/4	50 1/2	41 3/4

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